Exploring the influence of sociopolitical context on environmental education field trip effectiveness for adolescent youth in the United States

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Academic Abstract

Environmental education (EE) programs strive to develop an environmentally literate citizenry capable of addressing the world's environmental problems. However, environmental concerns have become increasingly politically polarizing. As middle school-age youth are developing their own identities, they are likely becoming aware of the dominant political attitudes and environmental messages within their own communities. This thesis investigates the influence of sociopolitical context on student learning outcomes following participation in EE field trips and whether particular approaches produce more positive learning outcomes for students from different contexts. We used a quantitative approach employing pre-existing databases and geographic information systems to create measures of sociopolitical context for each school in our sample based on political partisanship and socioeconomic status. I have organized my research in three chapters: Chapter 1 presents a more comprehensive introduction to the field of EE and extended literature review regarding the question this research intends to address. Chapter 2 presents a quantitative study exploring the influence of sociopolitical context on student outcomes following participation in an EE field trip. Chapter 3 presents a reflection of my graduate learning experience and what I hope to achieve in the future. Results suggest that EE field experiences lead to less positive outcomes for students from wealthier Democratic contexts. While we also found some differences in program characteristics associated with outcomes for each sociopolitical subgroup, effect sizes were small and thus warrant further investigation. We discuss potential explanations for these trends and call for further research on the influence of sociopolitical context and socioeconomic status with relation to EE.

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General Audience Abstract

Environmental education (EE) programs strive to develop an environmentally literate future citizenry capable of addressing the world's most pressing environmental problems. However, these environmental concerns have become increasingly politically polarized in recent decades. As adolescence is a critical period for identity development, middle school-age youth are likely aware of the political attitudes and environmental messages that dominate within their own communities. This thesis investigates the influence of sociopolitical context on student learning outcomes following participation in EE field trips and whether particular approaches to EE produce more positive learning outcomes for students from these different contexts. We used a quantitative approach employing pre-existing databases and geographic information systems to create measures of sociopolitical context for each school in our sample based on the political partisanship of a particular geographic area, as well as its interaction with socioeconomic status. Results suggest that EE field experiences lead to less positive outcomes for students from wealthier Democratic contexts; however, the authors call for further research on which approaches lead to better outcomes for students from different contexts.

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Chapter 1: Extended Literature Review

Background & Problem Statement

Since the Tbilisi Declaration in 1977, environmental education (EE) has aimed to develop an environmentally literate global citizenry by instilling individuals with the knowledge, skills, attitudes, and dispositions necessary to address environmental problems (UNESCO, 1977; UNESCO-UNEP, 1967; Hollweg et al., 2011). However, environmental issues and concerns, such as those that may be the focus of many EE programs, have become increasingly politicized in recent decades, especially in the United States (Dunlap et al., 2016). Since the 1970s, partisan polarization between Democrats and Republicans in the U.S. has intensified and, largely due to messaging from political elites, support for environmental issues has declined considerably among those identifying as the latter (Jacobson, 2012; Abramowitz & Saunders, 2006; Levendusky, 2009; Dunlap et al., 2016). Coinciding with this political polarization, the U.S. electorate has become increasingly geographically polarized, with Democrats and Republicans clustering into likeminded communities (Bishop, 2008; Johnston et al., 2016).

It is in this politically divided climate and these politically segregated communities that today's EE programs strive to produce greater environmental literacy in learners. To achieve these outcomes, researchers and practitioners have developed agreed upon "guidelines," or 'best practices' for the field (NAAEE, 2012, 2022). However, these guidelines are largely based on consensus opinions, with few studies empirically isolating the programmatic characteristics that lead to particular student learning outcomes, and even fewer studies doing so based on particular student identities. While there is broad evidence that EE programs can lead to increased student knowledge, awareness, skills, intentions, and behavior change, most empirical research provides case studies of single programs with different outcome measures, making it difficult to identify

trends across various programs and audiences (Stern et al., 2014). While examinations of sociocultural dimensions in EE have increased in recent years (Aguilar et al., 2017.; Bonta et al., 2015; Romero et al., 2019; Stern et al., 2022), a review of the literature identifies a gap in research. Although some studies have examined the social and political dimensions of EE program curricula (McKeown-Ice & Dendinger, 2000; Van Poeck & Östman, 2018; Schild, 2016; Slimani et al., 2021), we have been unable to find any studies that explicitly examine the relationship between students' sociopolitical context and EE learning outcomes at a national scale.

Sociopolitical context refers to the interaction of both social and political factors within a particular setting and the impact they may have on student learning (Nieto & Bode, 2008). For the purposes of this study, we use sociopolitical context to refer to the political partisanship of a particular geographic area, as well as its interaction with socioeconomic status. Research on the political socialization of youth indicates that, by middle school age, students have often developed modest political awareness shaped by family, community, and societal events; however, these political orientations remain malleable and partisan preferences are not fully formed (Lewis-Beck et al., 2008). Adolescence is a critical period for forming social identities and group attachments (Klimstra et al., 2010); developing critical thinking skills (Piaget, 1972) and environmental literacy (Kahn & Kellert, 2002); and extending moral reasoning from individual concerns to those of societal well-being (Kohlberg, 1971). In this study, we examine theories of social identity and political behavior to understand how sociopolitical context may influence outcomes for middle school-aged students on EE field trips. To develop the next generation of environmentally responsible citizens, EE will need to effectively engage all students regardless of their sociopolitical context – doing so in this increasingly polarized political climate may require reexamining best practices and pedagogical approaches. At this point in time, it is unclear if EE

programs are equally effective for students from different sociopolitical contexts (i.e. Democratic, Republican, or mixed), or if particular approaches to EE produce more positive learning outcomes for students from these different contexts. We examine each of these themes across sociopolitical contexts in the United States.

This study does not directly expand on research regarding the bases of sociopolitical context, partisanship, or the political socialization of youth. Rather, we apply findings from these lines of research to consider how current political polarization, particularly regarding science and environmental issues, may prompt students from different sociopolitical contexts to respond differently to EE programs (*Figure 1*). By applying these theories and understandings of sociopolitical context to EE, educators might better understand the identity-related needs of their audiences. This study also considers how certain EE programmatic characteristics might interact with these politically related social identities, evoking differing responses for students from politically heterogenous contexts compared to those from more conservative Republican-leaning or more liberal Democratic-leaning contexts (Table 1). We begin by examining how political polarization has contributed to the politicization of the environment before turning our attention to the political socialization of youth and the relevance of sociopolitical context to the field of EE.

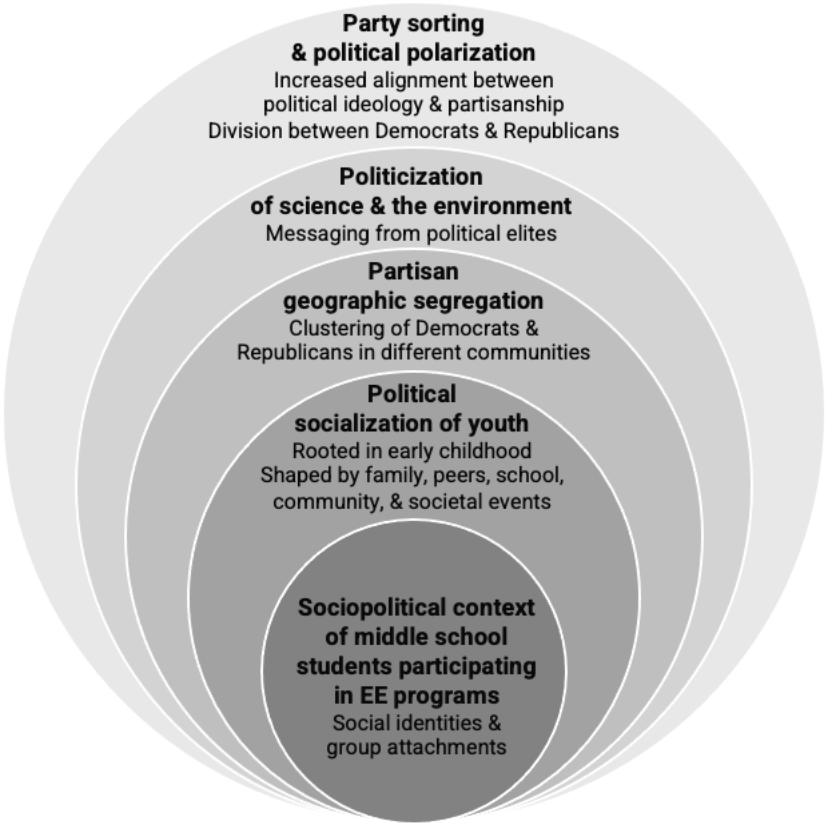


Figure 1. Concepts thought to shape the sociopolitical context of middle school-aged students participating in EE programs.

Political polarization in the U.S.

"Even the most casual observer of American politics cannot help but notice that partisan conflict has grown sharper, unrelenting, and more ideological over recent decades" (Hare & Poole, 2014, p. 411)

The social sciences have a long history of research aimed at understanding the relationship between party identification and policy attitudes, political ideology, and other social identities. We define each of these below and then examine how they interact to construct the current sociopolitical contexts of the U.S.

- *Party identification* – identification with one of the two major political parties in the U.S., Democrat or Republican
- *Political ideology* – a system of beliefs about the proper functioning of government and society; generally, a left-right spectrum of liberal, moderate, or conservative in the U.S.
- *Policy attitudes* – individual's preferences concerning what policies they want the government to pursue on different issues; also referred to as policy preferences, positions, or views
- *Social identity* – membership or identification with a particular group of people

Since the 1970s, American political behavior has become increasingly nationalized, with voters using the same criteria to select candidates in state and local elections as in federal elections (Hopkins, 2018). Furthermore, voters are increasingly more engaged with and/or knowledgeable about national politics than their own state or local politics. This phenomenon creates a disconnect between the local issues facing voters in their daily lives and the issues dominating national political discourse (Hopkins, 2018). As political behavior has become more nationalized, it has also fostered ideological polarization at the level of political elites. Upon examining congressmembers' ideological scores based on their roll-call votes since 1875, McCarty, Poole, & Rosenthal (2006) found that, since the 1970s, the Democratic Party has become consistently more liberal and the Republican Party more conservative. Although political ideology and party identification are not the same thing, the two have become increasingly aligned in recent decades (Levendusky, 2009). Political scientists largely agree that this partisan polarization has fundamentally transformed national politics. The increased polarization of political elites has provided clearer cues to the public about what the two parties stand for, making it easier for the public to distinguish between their positions on issues and thus, choose a party that aligned with

their own ideological and policy preferences or adopt the official positions of their chosen party (Jacobson, 2012).

Researchers remain somewhat conflicted about the degree to which elite-level polarization has resulted in a more politically ideological public. While some researchers argue that the American public is ideologically moderate and that increased polarization is predominantly limited to political elites (Fiorina, Abrams, & Pope, 2005), others provide evidence to suggest that, since the 1970s, the public has diverged along party lines with regard to both ideology and political issues (Abramowitz & Saunders, 1998, 2008; Abramowitz, 2010). Further, they find evidence that ideology has largely replaced the role of social identities (e.g., race/ethnicity, socioeconomic status, urbanity, religion, gender, etc.) in its relation to party identification – other than among African Americans, who tend to favor the Democratic Party regardless of ideology (Abramowitz & Saunders, 2006). Still, other researchers argue that emphasis on ideology is overstated, citing evidence that only the most knowledgeable 20-30% of citizens demonstrate polarized and coherent ideological orientations (Kalmoe, 2020; Fiorina et al., 2005). Examining American's opinions on a variety of issues, they contend that the public has not developed more ideologically polarized political views, but rather the process of "party sorting" has aligned partisan identities, ideologies, and policy preferences (Fiorina & Levendusky, 2006; Levendusky, 2009). But as Jacobson (2012) demonstrates, party sorting contributes to the polarization of the electorate even if voters themselves do not adopt more extreme positions on issues. Whether party sorting or ideological polarization, there is widespread consensus that the correlation between ideology and party identification has grown stronger in recent decades, aligning liberals with Democrats and conservatives with Republicans. Political scientists understand the strength of this correlation to

mean that we are living in an especially polarized era (Levendusky, 2009; Bafumi & Shapiro, 2009; Abramowitz & Saunders, 1998; Jost, 2017; Gelman, 2010).

While researchers debate the strength and coherence of a politically ideological electorate, party identification continues to be the most significant force in U.S. politics. Accounting for two to four times more variance in presidential votes than ideology or policy preferences, party identification provides a useful heuristic that allows voters to connect their own policy positions with the choices on the ballot without having to evaluate the policies and values of individual candidates (Kalmoe, 2020; Hopkins, 2018; Campbell et al., 1960). However, voting behavior has also been affected by party sorting and polarization as today's voters are demonstrating stronger party loyalty than they have in nearly 50 years. In both 2000 and 2004, more than 90 percent of Republican voters and nearly 90 percent of Democrat voters cast votes for their own party's presidential candidate (Abramowitz & Saunders, 2006). Split-ticket voting, such as voting for a Democrat for president and Republican for Congress or vice versa, has also been declining since the 1980s as politics have become more nationalized and voters more polarized (Gelman, 2010; Hopkins, 2018). As of 2012, presidential voting and voting for the House of Representatives was correlated at 0.95 (Jacobson, 2016). Similarly, Hopkins (2018) found county-level presidential and gubernatorial vote patterns increasingly correlated, demonstrating that this partisan voting behavior extends beyond national elections.

The nationalization and polarization of U.S. politics has reshaped more than party identification and voting behavior. It has also reshaped where Americans live and what policy attitudes they hold – including those on the environment. Further, groups like "liberals" and "conservatives" or "Democrats" and "Republicans" have come to represent strong social identities separate from a coherent set of policy attitudes and are characterized by "a sense of connection to

like-minded others" (Mason, 2018, p. 867; Ellis & Stimson, 2012; Kinder & Kalmoe, 2017; Malka & Lelkes, 2010; Mason, 2015). We examine each of these areas in more detail in the following sections.

Geographic sorting & spatial polarization

As the American political landscape has become increasingly politically polarized, it has also become increasingly geographically polarized – with Democrats and Republicans becoming largely segregated in different communities (Bishop, 2008; Johnston et al., 2020; Abramowitz & Saunders, 2008;). In the 2008 book, *The Big Sort*, Bishop suggests that "as Americans have moved over the past three decades, they have clustered in communities of sameness, among people with similar ways of life, beliefs, and, in the end, politics" (p. 5). Although the argument was that people were self-sorting into likeminded neighborhoods, the book's evidence for polarization relied on a comparison of "landslide counties" – which they defined as counties in which a presidential candidate won by 20 percentage points or more. In 1976, nearly 27 percent of voters lived in landslide counties. However, by 2004, over 48 percent of voters lived in landslide counties (Bishop, 2008).

The Big Sort ignited a range of research on spatial polarization, most of which has supported Bishop's original claims. The idea of partisan geographic sorting is supported by research demonstrating that partisanship indeed plays a role in migration patterns – though more so for Republicans than Democrats (Tam Cho et al., 2013). Subsequent studies have confirmed patterns of spatial polarization using landslide margins of both 10 percentage points at the state level (Abramowitz, 2010) and 20 percentage points at smaller scales (Johnston et al., 2016; Johnston et al., 2020). Using the 20-percentage point threshold, Johnston and colleagues (2020) found that the number of landslide counties has continued to increase since 1992, and by the 2016

election, 80% of counties produced landslide victories. Furthermore, 2016 was the first election in which the majority of votes (just over 60%) were cast in landslide counties. Findings from this study also reinforced the perception that support for Democrats has become more concentrated in major metropolitan areas, while support for Republicans is largely concentrated in exurb and rural areas (Johnston et al., 2020). Several studies further confirm that Democrats and Republicans have becoming increasingly geographically polarized and demonstrate that this trend exists at multiple scales – including Census division, state, county (Johnston et al., 2016; Morrill et al., 2007), precinct-level (Rohla et al., 2018), and several other micro-level scales (Myers, 2013; Sussell, 2013; Kinsella et al., 2015). Evidence of precinct and micro-level polarization supports Bishop's claim of increasingly polarized neighborhoods and provides background to the present study's use of school attendance zones as a spatial representation of students' immediate sociopolitical context.

Politicization of science & the environment

As partisan polarization intensified, political elites began to count the environment as one of the issues over which they became increasingly divided (Dunlap et al., 2016). Beginning in the 1970s and intensifying since the 1990s, Republicans have become increasingly opposed to environmental protection and regulations; meanwhile, Democrats have largely embraced a pro-environment agenda (Dunlap et al., 2001; Dunlap et al., 2016; McCright et al., 2014). Environmental concerns represent a "significant challenge to our traditional understandings of the role of humans in nature, as Americans have historically taken a very anthropocentric view emphasizing that humans have the right to use the environment to suit their needs" (Dunlap et al., 2001, p. 34). Emerging environmental policies and the culture surrounding environmentalism

represent a challenge to the status quo and can be perceived as potential threats by increasingly conservative Republicans (Dunlap et al., 2001; Hoffman, 2015).

Though more moderate than among political elites, the public is also increasingly divided in their personal worry about the quality of the environment, support for government spending on the environment, and perceptions of how the government is managing environmental protection (Dunlap, 2019; McCright et al., 2014). In 2019, the percentage of Democrats who believed the government was doing 'too little' to protect the environment swelled to three times that of Republicans – 86 and 25 percent respectively. The margin between the two has grown 38 percentage points since 2016. In addition, 65 percent of Democrats said they worry a great deal about environmental quality, compared to only 19 percent of Republicans – a gap that has grown every year since 2013 (Dunlap, 2019). This partisan division also extends to specific environmental issues, such as climate change. Despite widespread expert consensus, Republican political elites are increasingly skeptical of climate change and politicization of the issue has contributed to public divergence on a number of beliefs about climate change, including its cause, potential threats and effects, the state of scientific consensus, and the role of the news media (Dunlap et al., 2016; Kahan et al., 2011). Democrats are consistently more likely than Republicans to express concerns over climate change and hold beliefs that are consistent with scientific consensus, including the belief that climate change is caused by human activity (McCright & Dunlap, 2011; Funk & Hefferon, 2019).

Researchers have also uncovered that Americans' political orientations moderate the relationship between education and climate change knowledge and beliefs. While educational attainment and self-reported understanding of climate change were positively related to scientifically agreed-upon beliefs for Democrats and liberals, they were negatively or not at all

related to these beliefs for Republicans and conservatives (McCright & Dunlap, 2011). This means that additional information or education about climate change are unlikely to change the beliefs of conservatives and Republicans and signifies a troubling trend for those trying to teach and communicate about climate change – one that could have significant impacts on our ability to address climate change in the future.

Some researchers suggest that public skepticism of climate change is part of a larger national trend of skepticism towards scientific knowledge and suspicion of scientists (Gauchat, 2012; Motta, 2018; Merkley, 2020). This distrust and dislike of scientists, academics, and experts has been conceptualized as a form of anti-intellectualism (Hofstadter, 1963; Rigney, 1991). Gauchat (2012) suggests that anti-intellectual attitudes have increased in recent decades among the public, and particularly with conservatives, largely due to the politicization of science. Research has demonstrated that anti-intellectualism is associated with opposition to scientific consensus and scientifically agreed-upon policy matters (Merkley, 2020) and support for politicians who are skeptical of experts – a characteristic notably associated with Donald Trump during the 2016 presidential campaign (Motta, 2018).

Just as anti-intellectualist cues from prominent Republican leaders can be expected to shape public opinion and political behavior, making citizens more distrustful of science and experts, so can anti-environment messages. The increased politicization of environmental issues means that environmental messages are often associated with particular groups. Complex and politically contentious issues – such as those increasingly associated with the environment – can embody certain cues about partisan group identity that may serve as meaningful heuristics for less politically engaged individuals (Nisbet et al., 2015, p. 52; Cohen, 2003; Krishna & Sokolova, 2017; McCright & Dunlap, 2011; Abramowitz & Saunders, 2008; Huckfeldt et al., 2005). In the

following section, we consider the ways in which group identity and message source shape how individuals interpret new information.

Social identities, cultural commitments, & message source

Determining more than just policy attitudes, party identification and political ideology also represent strong social identities and cultural commitments that infuse messages with meaning and shape the way we interpret new information. Research has repeatedly shown that increasing scientific knowledge does not reliably result in increased acceptance of the reality of environmental risks (e.g., Kahan et al., 2012; Nisbet & Scheufele, 2009; Simis et al., 2016). Rather, pre-existing beliefs and group attachments, such as political parties, are instrumental in explaining how individuals process new information or construct their attitudes and beliefs (Taber & Lodge, 2006; Stern, 2018). As important social identities, such as race, religion, and ideology, have moved into greater alignment with Democrat and Republican identities, partisans have grown increasingly attached to these party-associated groups (Mason & Wronski, 2018).

Social identity theory suggests that shared group identification encourages in-group bias, in which group members positively define their in-group and negatively define members of an out-group (Tajfel and Turner, 1979). This form of biased systemic processing can manifest as motivated or identity-protective reasoning. Motivated reasoning refers to people's tendency to interpret new information in a way that serves their existing opinions, beliefs, or intuitions (Kahan, 2013; Kunda, 1990; Stern, 2018). Similarly, identity-protective reasoning is performed in service of maintaining one's group identity, which may refer to political party identification; political ideology; or the dominant goals, values, beliefs, and behaviors of one's reference group (e.g., friends, family members, coworkers, media or political elites) (Kahan, 2013; Stern, 2018). Both liberals and conservatives have been found to exhibit motivated and identity-protective reasoning

when exposed to scientific evidence that conflicts with their ideological worldview (Nisbet et al., 2015; Kahan, 2013). Though these reactions may vary by context, with more politically contentious issues (e.g., climate change and human evolution) eliciting greater responses than less prominent issues (e.g., fracking and nuclear energy), research shows that this negative response can result in diminished trust of the scientific community for members of both ideologies (Nisbet et al., 2015).

Related to motivated and identity-protective reasoning, Kahan's cultural cognition thesis suggests that regardless of facts or evidence to the contrary, individuals tend to adopt positions that align with the values of groups with which they identify and reinforce their connection to people with whom they share important cultural commitments, thus avoiding cognitive dissonance and protecting social standing (Kahan, 2010; Kahan et al., 2011, 2012). Rather than relying on political parties or ideology, cultural cognition thesis presents group identities along two continuums of cultural worldviews: egalitarian to hierarchical and communitarian to individualist. While cultural worldview and political orientation are modestly correlated (conservatives/Republicans tend to be more hierarchical individualists and liberals/Democrats tend to be more egalitarian communitarians), research shows that cultural worldviews exceed political orientation in explaining environmental risk perception (Wildavsky & Dake, 1990; Kahan et al., 2012). Further, research on cultural cognition has found that people who hold hierarchical or individualistic worldviews tend to be skeptical of environmental risks and oppose industry regulation; whereas people with egalitarian, communitarian worldviews tend to be suspicious of industry and support regulation as a means of reducing social inequality and environmental risk (Kahan et al., 2012; Stern, 2018).

Given the importance of social identity and cultural commitments in shaping political behavior, research shows that group message source can also have a powerful influence on how people interpret or respond to information (Cohen, 2003; Esposo et al., 2013; Fielding & Hornsey, 2016; Hornsey et al., 2002; Kahan, 2013). People look to those in their reference groups – particularly leaders – for help defining the social meaning of issues and attitude objects. When information about the position of one's political party is available, individuals tend to assume the position of their political in-group, regardless of policy content (Cohen, 2003). Furthermore, when a policy is said to be supported by the political out-group, individuals tend to oppose the policy, even if it aligns with the values of their political in-group. While more politically involved individuals are more likely to employ forms of biased systematic processing, even modestly partisan individuals have shared ideological or cultural commitments with certain groups or social identities and may engage in motivated or identity protective reasoning (Kahan, 2013). Research shows that even low-knowledge respondents accept message cues from in-group political elites, regardless of the political orientation of the message itself, and display heightened levels of affective polarization against members of their political out-group (Barber & Pope, 2018; Mason, 2018). These politically based social identities can help to explain the greater emergence of affective polarization witnessed during the 2016 presidential election cycle (Mason, 2018). As such, scholars have looked at the 2016 election of President Donald Trump not so much as a unique departure, but as a deepening reflection of ongoing ideological and partisan polarization coupled with the rise of negative partisanship (i.e., hostility toward the opposing party) (Abramowitz & McCoy, 2019; Jacobson, 2017; Mason, 2018).

Partisan divisions

Although Democrats and Republicans are deeply divided, research demonstrates that there are divisions and considerable variability within the two parties as well. While some divisions over policy objectives are longstanding, other divides are based largely on differences in race, class, education, and geography. Evidence suggests that these other group identities, particularly income and education level, are closely related to policy preferences and may interact with partisanship to frame people's views on economic, social, and environmental issues (Kitschelt & Rehm, 2019; Pew Research Center, 2021; AP-NORC Center for Public Affairs Research, 2015). In this section, we consider how the interaction of these demographic characteristics contributes to variability within the Democratic and Republican coalitions.

Focusing on White Americans, Kitschelt & Rehm (2019) used the interaction between education and income levels to explain the relatively recent realignment of voters between the two dominant political parties. Income – and to some degree, education – divides voters on economic issues, whereas education separates them on noneconomic, or social, issues. As the U.S. transitioned from an industrial society to a knowledge society, it experienced a "polarity reversal" in which the identity of swing and core voters flipped. Today, the former swing groups of high-education/low-income voters and low-education/high-income voters now represent the core constituencies for the Democrats and Republicans respectively. Largely employed as sociocultural professionals in social service, educational, cultural, and health care organizations, high-education/low-income voters tend to support liberal social policies, but are conflicted on economic issues. Conversely, low-education/high-income voters tend to support conservative social policies and oppose progressive economic policies while working as small business owners or salaried associates in retail, vocational, or personal services. Meanwhile, former core constituencies have

become the parties' new swing groups: high-education/high-income voters for Democrats and low-education/low-income voters for Republicans. Voters in the high-education/high-income group tend to oppose progressive economic policies; support liberal social policies; and occupy jobs in the scientific-technical, financial-business, and general managerial fields. Finally, "working class" individuals in the low-education/low-income group tend to support conservative social policies but progressive economic policies and are employed in blue-collar manufacturing or clerical-administrative jobs (Kitschelt & Rehm, 2019).

To understand the complexity of the current political climate, the Pew Research Center (2021) has created a political typology that classifies the electorate into nine distinct groups based on their political values and attitudes. In addition to distinct policy views, these groups also have distinct demographic characteristics. Among Democrats, two of the more liberal groups tend to be highly educated, wealthier, and among the most well-traveled. A third very liberal group tends to be younger, slightly less educated, lower income, and racially and ethnically diverse. Although they are less politically engaged, their liberalism is particularly evident when it comes to environmental issues and climate change. The fourth more moderate group tends to also be less educated, lower income, and more racially and ethnically diverse, with the largest share of Black Democrats concentrated in this group. It is well documented that since the 1960s, Black Americans have been almost exclusively associated with the Democratic Party, and as of 2019, 87% of Black voters identified as Democrats (compared with just 7% as Republican) (Kitschelt & Rehm, 2019; Gilberstadt & Daniller, 2020). However, a quarter of Black Democrats describe their political views as conservative, while another 43% describe themselves as moderates (Gilberstadt & Daniller, 2020). While Democratic-oriented groups are largely united in their views on climate change, environmental regulation, and alternative energy investment, more moderate and racially

diverse individuals tend to hold these views with less intensity (Pew Research Center, 2021; AP-NORC, 2015).

Within Republicans, two of the most conservative groups tend to be the wealthiest. One group is highly educated, while the other is overwhelmingly Christian. Meanwhile, a third very conservative group tends to be less educated, low-to-middle-income, and among the most rural. These more conservative groups tend to hold more utilitarian and resource-based views of the environment and are less likely to consider themselves environmentalists (AP-NORC, 2015). The fourth group is the youngest, least conservative, and most racially and ethnically diverse Republican-aligned group. Although they show a lower level of political engagement, this group is more likely to say that stricter environmental laws and regulations are worth the cost than compared to their other Republican counterparts (Pew Research Center, 2021).

With regard to the present study, this variability within Democrats and Republicans suggests that environmental messaging and perceptions may differ not only across sociopolitical contexts, but also across socioeconomic status, education level, race, and/or geographies. The sociopolitical contexts experienced by youth are complex and likely not easily defined as Democratic or Republican. However, by examining demographic characteristics as well as the interaction between sociopolitical context and socioeconomic status, we can begin to create a deeper understanding of the potential environmental messaging perceived by youth.

Political socialization of youth

Given the significance of party identification in the U.S. and its influence on political attitudes and worldviews, the social sciences have a long history of research dedicated to understanding its origins and persistence. Decades of research suggests that, as a result of parental influence, party identification is rooted in childhood and early adolescence (Jennings and Niemi,

1968, 1974; 1981; Campbell et al., 1960; Green et al., 2002). Children begin developing a vague political awareness as young as age 5, form general notions of political parties around ages 7 to 10, and can generally express partisan attachment by high school (ages 14 to 18) – and in most cases, that attachment is the same as one's parents (Connell, 1971; Lewis-Beck et al., 2008; Pettifor, 2012).

The degree to which parents are politically engaged also contributes to the future party identification and political engagement of their children. Analyzing a survey of parent-child pairs, Lewis-Beck and colleagues (2008) report that the transmission of party identification is far more successful in homes where parents actively discuss politics than in homes where they do not. While Dinas (2013) finds this trend to hold true for younger groups (ages 16-21), it reverses for older groups (ages 23-29), with those from more politically active households adopting partisan attachments opposite those of their parents. By engaging in political discussions at home, politically active parents provide youth with ample opportunities to encounter political stimuli. These youth become more receptive to the political stimuli encountered outside the home and are thus, more likely to adjust their own partisan preferences as young adults – particularly in response to major societal events (Dinas, 2013). Although party identification remains somewhat malleable through early adulthood, particularly for those with weak partisan attachments, once adopted it tends to become more stable over one's lifetime (Campbell et al., 1960; Lewis-Beck et al., 2008).

Beyond the family unit, researchers have also turned to youth's immediate social environment – schools, churches, and peer groups – for evidence of political socialization. While there is little evidence for direct transmission of party identification in all three settings (Tedin, 1980; Levin, 1961; Campbell, 1980), peer group and school appear to have some influence on political socialization. While peer influence is generally limited, it is increased when peers are

more politically active and share similar attitudes toward a prominent political issue (Campbell, 1980). However, political views and partisan identities developed at home are generally not modified by the peer group during childhood because they are not defining features that connect members of the group (Harris, 1998; Campbell, 1980). Much like the degree to which parents are politically active, school environments where politics are frequently discussed, through civic education programs for example, also contribute to the development of adolescent partisanship (Wolak, 2009; McDevitt & Chaffee, 2002). Further, research shows that youth can be active and thoughtful participants in developing their own partisan identities and political socialization, particularly in the high school years (Wolak, 2009).

Outside their immediate social environment, youth are exposed to the sociopolitical contexts of their community and greater society. State and regional differences in demographics, political messages, and partisan cultures also likely play a role in the political socialization of youth; however, less is known about the influence of geography (Wolak, 2009). These political circumstances vary not only spatially, but temporally as well. Youth are subject to the major events, issues, and political campaigns that define the era in which they mature. Research shows that politically turbulent and contentious world events can especially contribute to the development of young people's political attitudes and partisan identities (Jennings & Niemi, 1981; Wolak, 2009; Dinas, 2013; Jennings, 2002; MacKuen, 1987).

Viewed as a learning process, it becomes evident that the political socialization of youth probably arises from some combination of influence by family, school, peers, community, and societal events. Researchers Yates and Youniss (1998) perceptively depict youth as "reflective agents growing up within specific social and historical contexts and interpreting the options, opportunities, and restraints that they encounter" (p. 496). Not only do today's youth face massive

environmental challenges, but they are also growing up in an incredibly politically divisive era that undoubtedly shapes their sociopolitical context. With regard to education, sociopolitical context accounts for "the larger societal and political forces in a particular society and the impact they may have on student learning" (Nieto & Bode, 2008, p. 142). Teaching within a particular sociopolitical context means that educational decisions are often subject to the presence of these forces at the national, state, community, and school level (Dunn et al., 2019). As the present study is with middle school-age students, we can presume that they are likely still drawing on the political attitudes and partisan attachments of their parents and immediate social environment, rather than actively constructing their own. As such, when youth arrive to EE programs, they likely carry with them the environmental views that dominate their own sociopolitical contexts. However, because their worldviews, political ideologies, and partisan attachments remain more malleable and are developing alongside their knowledge of environmental issues, youth may be less likely to reject scientific facts based on pre-existing beliefs or cultural commitments (Stevenson et al., 2014).

Summary

In sum, American political behavior has become increasingly nationalized and polarized in recent decades. Messaging from political elites has aligned liberals with Democrats and conservatives with Republicans and led to increased polarization between the two parties. Some of this messaging has politicized both science and the environment and caused support for environmental issues, such as those that may be the focus of many EE programs, to decline among Republicans in particular. Concurrently, partisans have also become increasingly geographically polarized – clustering into politically homogenous communities. The result is that now, perhaps more than ever, people identify as liberal or conservative and cast their votes accordingly for

Democrats or Republicans. As this study aims to use school-level presidential, senate, and house election results as a measure of students' immediate sociopolitical context, areas with concentrated Republican or Democratic votes can thus be interpreted as conservative or liberal respectively.

Looking beyond party identification and political ideology, other pre-existing beliefs and groups attachment imbue environmental messages with meaning and influence the way people interpret new information – even those with low political awareness. In relation to the present study, this begs the question of whether middle school-aged students, who may be only marginally politically involved, are engaging in motivated and identity-protective reasoning or relying on heuristic cues about social identity to interpret new information presented on EE programs. The answer may be contextual, dependent upon the environmental issue under consideration, the manner in which content is delivered, or the extent to which participants are encouraged to think beyond their own intuitions. The present moment represents a unique opportunity for the field of EE to play a role in lessening the political polarization of environmental issues. Today's youth – such as those participating in EE programs – are more concerned and seemingly less polarized in their views on environmental issues (Pew Research Center, 2020; Parker et al., 2019; Funk & Hefferon, 2019). By first determining if EE programs are equally effective for students from different sociopolitical contexts, or if specific program characteristics contribute to more positive learning outcomes for students from different contexts, the field of EE can better tailor its teaching practices to meet the needs of its audiences.

References

Abramowitz, A. I. (2010). Transformation and polarization: The 2008 presidential election and the new American electorate. *Electoral Studies, 29*(4), 594–603. https://doi.org/10.1016/j.electstud.2010.04.006.

Abramowitz, A.I. & McCoy, J. (2019). United States: Racial resentment, negative partisanship, and polarization in Trump's America. *The ANNALS of the American Academy of Political and Social Science, 681*(1), 137-156. http://journals.sagepub.com/doi/10.1177/0002716218811309.

Abramowitz, A.I. & Saunders, K.L. (1998). Ideological realignment in the U.S. electorate. *The Journal of Politics, 60*(3), 634-652. https://www.journals.uchicago.edu/doi/10.2307/2647642.

Abramowitz, A.I. & Saunders, K.L. (2006). Exploring the bases of partisanship in the American electorate: Social identity vs. ideology. *Political Research Quarterly, 59*(2), 175-187. http://journals.sagepub.com/doi/10.1177/106591290605900201.

Abramowitz, A.I. & Saunders, K.L. (2008). Is polarization a myth? *The Journal of Politics, 70*(2), 542-555. https://www.journals.uchicago.edu/doi/10.1017/S0022381608080493.

Aguilar, O. M., McCann, E. P., & Liddicoat, K. (2017). Inclusive education. Pp. 194-201. In *Urban Environmental Education Review.* Russ, A. and Krasny M. (Eds.). Cornell University Press.

Associated Press-NORC Center for Public Affairs Research (AP-NORC*). Public opinion and the environment: The nine types of Americans*. AP-NORC: Chicago, IL, USA, 2015.

Bafumi, J., & Shapiro, R.Y. (2009). A new partisan voter. *Journal of Politics, 71*(1): 1-24.

Barber, M. & Pope, J.C. (2019). Does party trump ideology? Disentangling party and ideology in America. *American Political Science Review, 113*(1), 38-54. doi:10.1017/S0003055418000795.

Bishop, B. (2008). *The big sort: Why the clustering of like-minded America is tearing us apart.* Mariner Books.

Bonta, M., DeFalco, T., & Smith, C. T. (2015). *Diversity and the conservation movement.* National Audobon Society, 1–38.

Campbell, B.A. (1980). A theoretical approach to peer influence in adolescent socialization. *American Journal of Political Science, 24*(2), 324-344.

Campbell, A., Converse, P.E., Miller, W.E., & Stokes, D.E. (1960). *The American Voter*. Wiley.

Cohen, G.L. (2003). Party over policy: The dominating impact of group influence on political beliefs. Journal of *Personality and Social Psychology, 85*(5), 808-822. http://doi.apa.org/getdoi.cfm?doi=10.1037/0022-3514.85.5.808.

Connell, R.W. (1971). *The child's construction of politics*. Melbourne University Press.

Dinas, E. (2014). Why does the apple fall far from the tree? How early political socialization prompts parent-child dissimilarity. *British Journal of Political Science, 44*(4), 827-852. https://www.cambridge.org/core/product/identifier/S0007123413000033/type/journal_article.

Dunlap, R.E. (2019, April 5). Partisan polarization on the environment grows under Trump. *Gallup.* Retrieved from http://www.news.gallup.com.

Dunlap, R.E., Xiao, C., & McCright, A.M. (2001). Politics and environment in America: Partisan and ideological cleavages in public support for environmentalism. *Environmental Politics, 10*(4), 23-48. https://doi.org/10.1080/714000580.

Dunlap, R.E., McCright, A.M., Yarosh, J.H. (2016). The political divide on climate change: Partisan polarization widens in the U.S. *Environment 58*(5), 4-23.

Dunn, A.H., Sondel, B., & Baggett, H.C. (2019). "I don't want to come off as pushing an agenda": How contexts shaped teachers' pedagogy in the days after the 2016 U.S. Presidential election. *American Educational Research Journal, 56*(2), 444-476. DOI: 10.3102/0002831218794892.

Ellis, C., & Stimson, J. A. (2012). *Ideology in America*. Cambridge University Press.

Esposo, S. R., Hornsey, M. J., & Spoor, J. R. (2013). Shooting the messenger: Outsiders critical of your group are rejected regardless of argument quality. *British Journal of Social Psychology*, *52*(2), 386–395. https://doi.org/10.1111/bjso.12024.

Fielding, K. S., & Hornsey, M. J. (2016). A social identity analysis of climate change and environmental attitudes and behaviors: Insights and opportunities. *Frontiers in Psychology, 7,* 121. https://doi.org/10.3389/fpsyg.2016.00121.

Fiorina, M., Abrams, S.J., & Pope, J. (2005). *Culture war? The myth of a polarized America.* Pearson-Longman.

Fiorina, M. P., & Levendusky, M. S. (2006). Disconnected: The political class versus the people. In P. S. Nivola & D. W. Brady (Eds.), *Red and blue nation?* (Vol. 1, pp. 49-71). Washington, DC: The Brookings Institution.

Funk, C. & Hefferon, M. (2019, November 25). U.S. public views on climate and energy. *Pew Research Center*. Retrieved from https://www.pewresearch.org.

Gauchat, G. (2012). Politicization of science in the public sphere: A study of public trust in the United States, 1974-2010. *American Sociological Review, 77*(2), 167-187. DOI: 10.1177/0003122412438225

Gelman, A. (2010). *Red state, blue state, rich state, poor state: Why Americans vote the way they do.* Princeton University Press.

Gilberstadt, H. & Daniller. A. (2020). *Liberals make up the largest share of Democratic voters, but their growth has slowed in recent years.* Pew Research Center, January 17, www.pewresearch.org/fact-tank/2020/01/17/liberals-make-up-largest-share-ofdemocratic-voters/.

Green, D., Palmquist, B., & Schickler, E. (2002). *Partisan Hearts and Minds: Political Parties and the Social Identities of Voters*. Yale University Press.

Hare, C. & Poole, K.T. The polarization of contemporary American politics. *Polity 46*(2014): 411 – 429. Doi: 10.1057/pol.2014.10.

Harris, J.R. (1998). *The nurture assumptions: Why children turn out the way they do*. London: Bloomsbury.

Hoffman, A.J. (2015). *How culture shapes the climate change debate*. Stanford University Press.

Hofstadter, R. (1963). *Anti-intellectualism in American life.* Alfred A. Knopf.

Hollweg, K. S., Taylor, J. R., Bybee, R. W., Marcinkowski, T. J., McBeth, W. C., & Zoido, P. (2011). *Developing a framework for assessing environmental literacy.* Washington, DC: North American Association for Environmental Education. Available at http://www.naaee.net.

Hopkins, D.J. (2018). *The increasingly United States: How and why American political behavior nationalized.* The University of Chicago Press.

Hornsey, M. J., Oppes, T., & Svensson, A. (2002). "It's OK if we say it, but you can't": Responses to intergroup and intragroup criticism. *European Journal of Social Psychology, 32*(3), 293–307.

Huckfeldt, R., Mondak, J.J., Craw, M., Morehouse Mendez, J. (2005). Making sense of candidates: Partisanship, ideology, and issues as guides to judgement. *Cognitive Brain Research, 23*(1), 11-23. https://linkinghub.elsevier.com/retrieve/pii/S0926641005000133.

Jacobson, G.C. (2012). The electoral origins of polarized politics: Evidence from the 2010 Cooperative Congressional Election Study. *American Behavioral Scientist, 56*(12), 1612-1630. DOI: 10.1177/0002764212463352

Jacobson, G.C. (2016). The electoral connection, then and now. In A.S. Gerber & E. Schickler (Eds.), *Governing in a polarized age: Elections, parties, and political representation in America*. (pp. 15-34) Cambridge University Press.

Jacobson, G.C. (2017). The triumph of polarized partisanship in 2016: Donald Trump's improbable victory. *Political Science Quarterly, 132*(1), 9-41. http://doi.wiley.com/10.1002/polq.12572.

Jennings, M.K. & Niemi, R.G. (1968). The transmission of political values from parent to child. American *Political Science Review, 62,* 169-184.

Jennings, M.K., Niemi, R.G., 1974. *The political character of adolescence: The Influence of families and schools.* Princeton University Press.

Jennings, M.K. & Niemi, R.G. (1981). *Generations and politics: A panel study of young adults and their parents.* Princeton University Press.

Jennings, M.K. (2002). Generation units and the student protest movement in the United States: an intra- and intergenerational analysis. *Political Psychology, 23*(2), 303-324.

Johnston, R., Manley, D., Jones, K. (2016). Spatial polarization of presidential voting in the United States, 1992-2012: The "Big Sort" revisited. *Annals of the American Association of Geographers, 106*(5), 1047-1062. http://www.tandfonline.com/doi/full/10.1080/24694452.2016.1191991.

Johnston, R., Manley, D., Jones, K., Rohla, R. (2020). The geographical polarization of the American electorate: A country of increasing electoral landslides? *GeoJournal, 85*(1), 187-204. http://link.springer.com/10.1007/s10708-018-9955-3.

Jost, J.T. (2017). Asymmetries abound: Ideological differences in emotion, partisanship, motivated reasoning, social network structure, and political trust. *Journal of Consumer Psychology, 27*(4), 546-553. http://doi.wiley.com/10.1016/j.jcps.2017.08.004.

Kahan, D.M. (2010). Fixing the communications failure. *Nature 463,* 296-7.

Kahan, D.M. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgement and Decision Making, 8,* 407-424.

Kahan, D.M., Donald, B., Jenkins-Smith, H. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research, 14*(2), 147-74. doi: 10.1080/13669877.2010.511246.

Kahan, D.M., Peters, E., Wittlin, M., Slovic, P., Larrimore Ouellette, L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change, 2,* 732-735. DOI: 10.1038/NCLIMATE1547.

Kahn, P.H. & Kellert, S.R. (2002). *Children and nature: Psychological, sociocultural, and evolutionary investigations* (p. 117–151). MIT Press.

Kalmoe, N.P. (2020). Uses and abuses of ideology in political psychology. *Political Psychology, 41*(4), 771-793. doi: 10.1111/pops.12650.

Kinder, D. R., & Kalmoe, N. P. (2017). *Neither liberal nor conservative: Ideological innocence in the American public.* University Of Chicago Press.

Kinsella, C., McTague, C., & Raleigh, K.N. (2015). Unmasking geographic polarization and clustering: A micro-scalar analysis of partisan voting behavior. *Applied Geography, 62*, 404-419. https://linkinghub.elsevier.com/retrieve/pii/S0143622815001071.

Kitschelt, H.P. & Rehm, P. (2019). Secular partisan realignment in the United States: The socioeconomic reconfiguration of white partisan support since the New Deal era. *Politics & Society, 47*(3), 425-479. https://doi.org/10.1177/0032329219861215.

Klimstra, T. A., Hale III, W. W., Raaijmakers, Q. A., Branje, S. J., & Meeus, W. H. (2010). Identity formation in adolescence: Change or stability? *Journal of Youth and Adolescence, 39*(2), 150-162.

Kohlberg, L. (1971). Stages of moral development. *Moral Education, 1*(51), 23-92.

Krishna, A. & Sokolova, T. (2017). A focus on partisanship: How it impacts voting behaviors and political attitudes. *Journal of Consumer Psychology, 27*(4), 537-545. http://doi.wiley.com/10.1016/j.jcps.2017.07.005.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin, 108*(3), 480-498.

Levendusky, M. (2009). *The partisan sort: How liberals became Democrats and conservatives became Republicans*. The University of Chicago Press.

Levin, M.L. (1961). Social climates and political socialization. *The Public Opinion Quarterly, 25*(4), p. 596-606.

Lewis-Beck, M., Jacoby, W.G., Norpoth, H., Weisberg, H.F. (2008). *The American Voter Revisited.* The University of Michigan Press.

MacKuen, M. & Brown, C. (1987). Political context and attitude change. *American Political Science Review, 81*(2), 471-490. https://www.cambridge.org/core/product/identifier/S0003055400194468/type/journal_article.

Malka, A., & Y. Lelkes. (2010). More than ideology: Conservative–liberal identity and receptivity to political cues. *Social Justice Research, 23*(2–3), 156–188.

Mason, L. (2015). “I disrespectfully agree”: The differential effects of partisan sorting on social and issue polarization. *American Journal of Political Science, 59*(1), 128–145.

Mason, L. (2018). Ideologues without issues: The polarizing consequences of ideological identities. *Public Opinion Quarterly, 82*(S1), 866-887. https://academic.oup.com/poq/article/82/S1/866/4951269.

Mason, L. & Wronski, J. (2018). One tribe to bind them all: How our social group attachments strengthen partisanship. *Political Psychology, 39*(1), 257-277. http://doi.wiley.com/10.1111/pops.12485.

McCarty, N., K. T. Poole, and H. Rosenthal. 2006. *Polarized America: The Dance of Ideology and Unequal Riches.* MIT Press.

McCright, A.M., Xiao, C., & Dunlap, R.E. (2014). Political polarization on support for government spending on environmental protection in the USA, 1974-2012. *Social Science Research 48*(2014), 251-260. http://dx.doi.org/10.1016/j.ssresearch.2014.06.008.

McCright, A.M. & Dunlap, R.E. (2011). The politicization of climate change and polarization in the American public’s views of global warming, 2001-2010. *The Sociological Quarterly, 52*(2), 155-194. DOI: 10.1111/j.1533-8525.2011.01198.x.

McDevitt, M. & Chaffee, S. (2002). From top-down to trickle-up influence: Revisiting assumptions about the family in political socialization. *Political Communication, 19*(3), 281-301. http://www.tandfonline.com/doi/abs/10.1080/01957470290055501.

McKeown-Ice, R. & Dendinger, R. (2000). Socio-political-cultural foundations of environmental education. *The Journal of Environmental Education, 31*(4), 37-45. https://doi.org/10.1080/00958960009598650.

Merkley, E. (2020). Anti-intellectualism, populism, and motivated resistance to expert consensus. *Public Opinion Quarterly, 84*(1), 24-48. doi:10.1093/poq/nfz053.

Morrill, R., Knopp, L., & Brown, M. (2007). Anomalies in red and blue: Exceptionalism in American electoral geography. *Political Geography, 26*(5), 525-553. https://linkinghub.elsevier.com/retrieve/pii/S0962629807000418.

Motta, M. (2018). The dynamics and political implications of anti-intellectualism in the United States. *American Politics Research, 46*(3), 465-498. DOI: 10.1177/1532673X17719507.

Myers, A.S. (2013). Secular geographical polarization in the American South: The case of Texas, 1996-2010. *Electoral Studies, 32*(1), 48-62. https://linkinghub.elsevier.com/retrieve/pii/S0261379412001229.

NAAEE (North American Association for Environmental Education). 2012. *Guidelines for Excellence.* Washington, DC: North American Association for Environmental Education.

NAAEE. (2022, February 9). *Guidelines for excellence: best practice in EE*. NAAEE. Retrieved February 24, 2022, from https://naaee.org/our-work/programs/guidelines-excellence.

Nieto, S., & Bode, P. (2008). *Affirming diversity: The sociopolitical context of multicultural education*. Allyn & Bacon.

Nisbet, E.C., Cooper, K.E., Garrett, R.K. (2015). The partisan brain: How dissonant science messages lead conservatives and liberals to (dis)trust science. *The ANNALS of the American Academy of Political and Social Science, 658*(1), 36-66. http://journals.sagepub.com/doi/10.1177/0002716214555474.

Nisbet, M.C., & Scheufele, D.A. (2009). What's next for science communication? Promising directions and lingering distractions. *American Journal of Botany, 96*(10), 1767-1778. doi:10.3732/ajb.0900041.

Parker, K., Graf, N., & Igielnik, R. (2019, January 7). Generation Z looks a lot like millennials on key social and political issues. *Pew Research Center*. Retrieved from https://www.pewsocialtrends.org.

Pettifor, H. (2012). Do parents affect the early political prioritization of nature in their children? *ISER Working Paper Series, No. 2012-11*, University of Essex, Institute of Social and Economic Research (ISER), Colchester.

Pew Research Center (2020). *As Economic Concerns Recede, Environmental Protection Rises on the Public's Policy Agenda*. Washington, DC: Pew Research Center. Available online at: https://www.pewresearch.org/politics/2020/02/13/as-economic-concerns-recede-environmental-protection-rises-on-the-publics-policy-agenda/ (accessed March 29, 2021).

Pew Research Center (2021). *Beyond red vs. blue: The political typology.* Washington, DC: Pew Research Center. Available online at: https://www.pewresearch.org/politics/2021/11/09/beyond-red-vs-blue-the-political-typology-2/.

Piaget, J. (1972) *The Psychology of Intelligence.* Totowa: Littlefield.

Rigney, D. (1991). Three kinds of anti-intellectualism: Rethinking Hofstadter. *Sociological Inquirty, 61*(4), 434-451.

Rohla, R., Johnston, R., Jones, K., & Manley, D. (2018). Spatial scale and the geographical polarization of the American electorate. *Political Geography, 65*, 117-122. https://linkinghub.elsevier.com/retrieve/pii/S096262981730238X.

Romero, V., Foreman, J., & Strang, C., Rodriquez, L., Payan, R., & Moore Baily, K. (2019). *Examining equitable and inclusive work environments in environmental education: Perspectives from the field and implications for organizations.* Berkley, CA.

Schild, R. (2016). Environmental citizenship: What can political theory contribute to environmental education practice? *The Journal of Environmental Education, 47*(1), 19-34. https://doi.org/10.1080/00958964.2015.1092417.

Simis, M.J., Madden, H., Cacciatore, M.A., & Yeo, S.K. (2016). The lure of rationality: Why does the deficit model persist in science communication? *Public Understanding of Science, 25*(4), 400-414. DOI: 10.1177/0963662516629749.

Slimani, M., Lange, J., & Hakansson, M. (2021). The political dimension in environmental education curricula: Towards an integrative conceptual and analytical framework. *Environmental Education Research, 27*(3), 354-365. https://doi.org/10.1080/13504622.2021.1879023

Stern, M.J. (2018). *Social science theory for environmental sustainability*. Oxford University Press.

Stern, M. J., Powell, R. B., & Hill, D. (2014). Environmental education program evaluation in the new millennium: what do we measure and what have we learned? *Environmental Education Research, 20*(5), 581-611. https://doi.org/10.1080/13504622.2013.838749.

Stern, M.J. & Powell, R.B., & Frensley, B.T. (2022). Environmental education, age, race, and socioeconomic class: An exploration of differential impacts of field trips on adolescent youth in the United States. *Environmental Education Research*. DOI: 10.1080/13504622.2021.1990865.

Stevenson, K. T., Peterson, M. N., Bondell, H. D., Moore, S. E., and Carrier, S. J. (2014). Overcoming skepticism with education: Interacting influences of worldview and climate change knowledge on perceived climate change risk among adolescents. *Clim. Change* 126, 293–304. doi: 10.1007/s10584-014-1228-7

Sussell, J. (2013). New support for the big sort hypothesis: An assessment of partisan geographic sorting in California, 1992-2010. *PS: Political Science & Politics, 50*(4), 768-773. https://doi.org/10.1017/S1049096513001042.

Taber, C.S., & Lodge, M. (2006). Motivated skepticism in the evaluation of political beliefs. *American Journal of Political Science, 50*(3), 755-769.

Tajfel, H., & Turner, J. (1979). An Integrative Theory of Intergroup Conflict. In W.G. Austin & S. Worchel (Eds.), *The Social Psychology of Intergroup Relations*, (pp. 33–37). Monterey, CA: Brooks/Cole.

Tam Cho, W.K., Gimpel, J.G., Hui, I.S. (2013). Voter migration and the geographic sorting of the American electorate. *Annals of the Association of American Geographers, 103*(4), 856-870. http://www.tandfonline.com/doi/abs/10.1080/00045608.2012.720229.

Tedin, K.L. (1980). Assessing peer and parent influence on adolescent political attitudes. *American Journal of Political Science, 24*(1), 136-154.

UNESCO-UNEP. (1976). *The Belgrade Charter*. Connect: UNESCO-UNEP Environmental Education Newsletter, 1 (1), 1-2.

UNESCO, U. (1977). The Tbilisi Declaration. In *Intergovernmental Conference on Environmental Education* (pp. 14–26).

Van Poeck, K., Östman, L. (2018). Creating space for 'the political' in environmental and sustainability education practice: a Political Move Analysis of educators' actions. *Environmental Education Research, 24*(9), 1406-1423. http://dx.doi.org/10.1080/13504622.2017.1306835

Wildavsky, A., & Dake, K. (1990). Theories of risk perception: Who fears what and why? *Daedalus, 119*(4), 41-60.

Wolak, J. (2009). Explaining change in party identification in adolescence. *Electoral Studies, 28*(4), 573-583. https://linkinghub.elsevier.com/retrieve/pii/S0261379409000523.

Yates, M. & Youniss, J. (2010). Community service and political identity development in adolescence. *Journal of Social Issues, 54*(3), 495-512. http://doi.wiley.com/10.1111/j.1540-4560.1998.tb01232.x.

Chapter 2: Exploring the influence of sociopolitical context on environmental education field trip effectiveness for adolescent youth in the United States

Emily G. Thorpe

Abstract

In the United States, Democrats and Republicans have become increasingly politically and geographically polarized, as have environmental issues. It is under these circumstances that today's EE programs strive to produce greater environmental literacy in learners. As part of a national study of environmentally focused single-day field trips for adolescent youth in 2018, we examined how outcomes differed for public school students from different sociopolitical contexts (i.e., Democratic, Republican, or mixed), and what program characteristics contributed to more positive outcomes for students from each context across 235 programs. Students from wealthier Democratic contexts exhibited less positive outcomes compared to those from others. We also observed some differences in program characteristics associated with outcomes for each sociopolitical subgroup; however, effect sizes were small. Thus, these relationships provide hypotheses for further investigation rather than definitive patterns. We discuss potential explanations for these trends and call for further research on the influence of sociopolitical context and socioeconomic status with relation to EE.

Keywords: Environmental education, sociopolitical context, student outcomes

Introduction

Environmental education (EE) aims to develop environmental literacy by instilling individuals with the knowledge, skills, attitudes, and dispositions necessary to address environmental problems (UNESCO, 1977; Hollweg et al., 2011). However, environmental issues and concerns, such as those that may be the focus of many EE programs, have become increasingly

politicized in recent decades (Dunlap et al., 2016). As partisan polarization between Democrats and Republicans has intensified since the 1970s, support for the environment has declined considerably amongst those identifying as the latter, largely due to messaging at the level of political elites (Jacobson, 2012; Abramowitz & Saunders, 2006; Levendusky, 2009; Dunlap et al., 2016). Coinciding with this political polarization, the American electorate has become increasingly geographically polarized, with Democrats and Republicans clustering into likeminded communities (Bishop, 2008; Johnston et al., 2016, 2020). Moreover, income levels add further nuance to political identity formation, with wealthier groups of Democrats and Republicans exhibiting somewhat different political views than their poorer counterparts (Kitschelt & Rehm, 2019; Pew Research Center, 2021; AP-NORC, 2015).

It is in this politically divided climate and these politically segregated communities that today's EE programs strive to produce greater environmental literacy in learners. Although some studies have examined the social and political dimensions of EE program curricula (McKeown-Ice & Dendinger, 2000; Van Poeck & Östman, 2018; Schild, 2016; Slimani et al., 2021) and others have demonstrated the influence of socioeconomic status on student outcomes (Stern et al., 2022), we have been unable to find any studies that explicitly examine the relationship between students' sociopolitical context and EE learning outcomes at a national scale. This study represents a preliminary step in identifying how EE outcomes might differ in different sociopolitical contexts in the U.S. and how sociopolitical context and socioeconomic context may interact to produce different outcomes for learners. Further, we examine what approaches have more or less positive influences on outcomes for students from different sociopolitical contexts.

Middle school-aged students (grades 5-8; ages 10-14) were chosen for this study both because a large share of EE programs serve this audience and because research suggests this is a

developmentally critical period for forming identity, morality, environmental literacy, 21st century skills, and connection to place and community (Piaget, 1972; Kohlberg, 1971; Kahn & Kellert, 2002; Kroger, 2006). Research on the political socialization of youth also indicates that, by middle school age, students have developed modest political awareness shaped by family, community, and major societal events (Jennings & Niemi, 1974, 1981; Lewis-Beck et al., 2008). As students of this age become aware of the dominant political messages in their own communities, they likely begin to incorporate these messages into their own identities and worldviews; therefore, we might expect students to be meaningfully influenced by the political beliefs and identities of the voting age adults in their community.

This study draws from theories and literature related to the politicization of science and the environment, party sorting and geographic polarization, and youth political socialization to develop an understanding of the sociopolitical context of middle-school aged students attending field-based EE programs. As part of a larger study of single-day EE field trips for adolescent youth within the United States, this study explores trends in program outcomes for participants from different sociopolitical contexts. The specific research questions are as follows:

1. *Are EE programs equally effective for middle school students (grades 5-8) from different sociopolitical contexts?*
2. *Does sociopolitical context interact with socioeconomic context to produce different outcomes for different groups of students?*
3. *What EE program characteristics most influence positive learning outcomes for middle school students from different sociopolitical contexts?*

Literature Review

Sociopolitical contexts of youth

Literature suggests that, as a result of parental influence, partisan identification is rooted in early childhood. Children begin developing a vague political awareness as young as age 5, form general notions of political parties around ages 7 to 10, and can generally express partisan loyalty by high school (ages 14 to 18) (Pettifor, 2012; Connell, 1971; Lewis-Beck et al., 2008; Campbell et al., 1960). Partisan and ideological identities, such as Democrat, Republican, conservative, or liberal, represent strong social identities characterized by a "sense of connection to like-minded others" (Mason, 2018, p. 867; Kinder & Kalmoe, 2017). Social science research demonstrates that these group attachments are instrumental in explaining how individuals process new information, construct their attitudes and beliefs, or respond to particular message sources (Taber & Lodge, 2006; Tajfel and Turner, 1979; Kahan, 2010, 2013; Stern, 2018; Cohen, 2003). Even individuals with only modest political awareness, such as adolescent youth, may draw on politically based social identities in response to out-group messages (Mason, 2018; Cohen, 2003; Barber & Pope, 2018). It is in these ways that group identification helps to structure individuals' political thinking and behavior.

In addition to influence by the immediate family, school environments, peer groups, and state and regional differences in demographics, political messages, and partisan cultures may also contribute to the development of young people's political attitudes and partisan identities (Tedin, 1980; Levin, 1961; Campbell, 1980; Dinas, 2013; Jennings & Niemi, 1981; Wolak, 2009; Jennings, 2002; MacKuen, 1987). In the 2008 book, *The Big Sort*, Bishop suggests that Americans "have clustered in communities of sameness, among people with similar ways of life, beliefs, and, in the end, politics" (p. 5). Several studies further confirm that Democrats and Republicans have become increasingly geographically polarized and demonstrate that this trend exists at multiple scales – including Census division, state, county (Johnston et al., 2016; Morrill et al., 2007),

precinct-level (Rohla et al., 2018), and several other micro-level scales (Myers, 2013; Sussell, 2013; Kinsella et al., 2015). Further, support for Democrats has become more concentrated in major metropolitan areas, while support for Republicans is largely in exurb and rural areas (Johnston, 2020). Evidence of precinct and micro-level polarization supports Bishop's claim of increasingly polarized communities and provides background to the present study with regard to students' experienced sociopolitical context.

The sociopolitical contexts of adolescent youth are also influenced by the major events, issues, and political campaigns that define the era in which they mature. Politically turbulent and contentious world events, in particular, can contribute to the development of their political attitudes and partisanship (Jennings, 2002; Gimpel et al., 2003; Wolak, 2009). Based on evidence of increasing consistency between political ideology and party identification as well as significant declines in split-ticket voting, political scientists generally agree that we are living in an especially polarized era (Levendusky, 2009; Bafumi & Shapiro, 2009; Abramowitz & Saunders, 1998, 2006; Jost, 2017; Gelman, 2010). Since the 1970s, American political behavior has become increasingly ideologically polarized, both at the level of political elites and amongst the general public (Hopkins, 2018; Jacobson, 2012; Abramowitz & Saunders, 2006). "Party sorting" at the level of political elites has aligned liberals with Democrats and conservatives with Republicans and provided clearer cues to the general public about what the two parties stand for with regard to particular issues – such as the environment or more specifically, climate change (Levendusky, 2009; Jacobson, 2012; Dunlap, et al., 2016).

Beginning in the 1970s and intensifying since the 1990s, Republicans have become increasingly opposed to environmental protection and regulations; meanwhile, Democrats have largely embraced a pro-environment agenda (Dunlap et al., 2001; Dunlap et al., 2016; McCright

et al., 2014). Partisans are also increasingly divided in their personal worry about the quality of the environment (Dunlap, 2019) as well as their beliefs and concerns about climate change, despite widespread expert consensus (Dunlap et al., 2016; Funk & Hefferon, 2019; Kahan et al., 2011; McCright & Dunlap, 2011). Complex and politically contentious issues – such as those associated with the environment – can embody certain cues about partisan group identity that may serve as meaningful heuristics for less politically engaged individuals, such as middle school students (Nisbet et al., 2015, p. 52; Cohen, 2003; Krishna & Sokolova, 2017; McCright & Dunlap, 2011; Abramowitz & Saunders, 2008; Huckfeldt et al., 2005). Some researchers suggest that conservatives' skepticism of climate change is part of a larger national trend of anti-intellectualism, largely attributable to the politicization of science and characterized by distrust of scientific knowledge and suspicion of scientists (Gauchat, 2012; Motta, 2018; Merkley, 2020; Hofstadter, 1963; Rigney, 1991). Anti-intellectual or anti-environmental cues from prominent Republican leaders can be expected to shape public opinion and political behavior, making citizens more distrustful of science and experts.

Although Democrats and Republicans remain deeply polarized, research demonstrates that there are divisions and considerable variability within the two parties as well. While some disagreements over policy objectives are longstanding, other divides are based largely on differences in race, class, education, and geography. There is evidence to suggest that socioeconomic status interacts with partisanship to frame people's views on economic, social, and environmental issues (Kitschelt & Rehm, 2019; Pew Research Center, 2021; AP-NORC, 2015). Among Republicans, wealthier individuals tend to be either more highly educated, fiscally conservative, and socially moderate or very religious, fiscally and socially conservative, and more rural. Those with low to moderate incomes tend to be less educated, more socially conservative,

and live in more rural areas (Pew Research Center, 2021). Although pro-environmental messages are prevalent in Democratic settings, lower income, less educated, and more racially diverse Democratic voters tend to hold more moderate political views regarding the environment (Pew Research Center, 2021; Kitschelt & Rehm, 2019). Meanwhile, research shows that environmental concerns are most pervasive among wealthier and more highly educated liberal Democrats. These individuals also tend to be more well-traveled and hold more cosmopolitan views (AP-NORC, 2015; Dunlap, et al., 2001; Pew Research Center, 2021; Kitschelt & Rehm, 2019; Pichler, 2011). Cosmopolitanism generally refers to "an openness to and appreciation of other cultures, values, and experiences," often stemming from greater exposure to a wider array of people and ideas (Keating, 2016, p. 340).

Diffusion theory suggests that early adopters of innovation tend to have higher socioeconomic status, more formal education, more exposure to mass media and interpersonal channels of communication, and are more cosmopolitan (Rogers, 1995). Applying a "diffusion-of-innovations perspective that treats environmentalism as a set of ideas, values, and beliefs," Pampel & Hunter (2012) found that environmental concern may originate among individuals of higher socioeconomic status before spreading to lower socioeconomic groups. As wealthier Democrats tend to be more liberal, highly educated, well-traveled, and cosmopolitan, we might infer them to be 'early adopters' of the environmental messaging that predominates in liberal contexts. Research also suggests that the information sources of liberal Democrats tend to be more varied and less insular than those of their conservative Republican counterparts, who are more likely to engage in homogenous social networks (i.e., "echo chambers") and whose limited information sources provide less access to liberal messages than vice versa (Barberá, 2020; Wittenberg & Berinsky, 2020; Grossman & Hopkins, 2016; Massanari & Howard, 2011).

The sociopolitical contexts of today's adolescent youth are complex; shaped not only by the demographic characteristics of their families and communities, but also by ongoing political polarization and increased politicization of science and the environment. Although they may be somewhat politically aware, the middle school-aged youth in this study are likely still forming their own political orientations and partisan preferences. When students arrive to EE programs, they likely carry with them the environmental views that dominate within their own politically distinct communities. Although Stern and colleagues (2021) found that students from different socioeconomic backgrounds experience EE programs differently, with poorer students generally exhibiting more positive outcomes, we know of no similar study exploring how EE may function differently in different sociopolitical contexts. Based on the trends outlined above, we might hypothesize that students from Democratic contexts, with more prior exposure to pro-environmental messaging, might be the most predisposed to positive reception of EE programs. This study examines whether EE program outcomes differ for students based on sociopolitical context and whether different approaches to EE tend to achieve more or less positive outcomes for students from these different contexts.

Environmental education & pedagogical practices

While there is broad evidence that EE programs can lead to increased student knowledge, awareness, skills, intentions, and behavior change (Ardoin et al., 2018; Stern et al., 2014), it remains unclear if EE programs are equally effective for students from different sociopolitical contexts. Moreover, we know of no studies that have endeavored to empirically isolate the programmatic characteristics that lead to particular student learning outcomes for different groups. The present study explores relationships between certain programmatic characteristics (Table 1) and environmental literacy outcomes (Table 2) for students from different sociopolitical contexts.

We examine each of these program characteristics in more detail and highlight our hypotheses for their interaction with sociopolitical context in bold below. While we test the interactions between sociopolitical context and socioeconomic context, our hypotheses are limited to those regarding politics, as this forms the central inquiry of study.

Educator characteristics

Social identity theory suggests that shared group identification, such as Democrat or Republican, encourages in-group bias in which group members positively define their in-group and negatively define members of an out-group (Tajfel and Turner, 1979). Research shows that perceptions about whether messages come from in-group or out-group sources can influence how people interpret or respond to information (Cohen, 2003; Kahan, 2013; Esposo et al., 2013; Fielding & Hornsey, 2016; Hornsey et al., 2002). In other words, people look to those in their reference groups (e.g., friends, family members, coworkers, and media or political elites) – particularly leaders – for help defining the social meaning of issues (Cohen, 2003; Stern, 2018). When interacting with those outside these personal reference groups, individuals often make quick decisions about how to identify messengers, such as environmental educators, as in-group or out-group (Chaiken, 1980).

Certain educator characteristics may negatively influence program outcomes if students perceive the educator as a member of their out-group. Considering contemporary trends of anti-intellectualism amongst conservatives, educators who display high degrees of *eloquence* or assume a *walking encyclopedia identity* (i.e., focus on conveying a large number of facts, use jargon frequently, etc.) could be perceived as out-group messengers for students from Republican contexts, particularly given the subject matter of EE programs. **We therefore hypothesized that educator *eloquence* and the *walking encyclopedia identity* would contribute to less positive**

outcomes for groups from Republican contexts. Further, given that students from Republican contexts may be less predisposed to agree with core elements of EE programming, educators who put students on the spot to answer questions or engage in dialogue may feel threatening. **Therefore, we hypothesized that *verbal engagement* may contribute to less positive outcomes for students from Republican contexts.**

Research also suggests that, compared to liberals and Democrats, conservatives and Republicans place a greater emphasis on hierarchy and deference to authority (Kahan et al., 2012; Wildavsky & Dake, 1990; Haidt, 2012). **Therefore, we hypothesized that the *authority figure educator identity* may contribute to more positive outcomes for students from conservative Republican contexts than students from liberal Democratic contexts.**

Group interaction

Vygotsky's Sociocultural Theory of Cognitive Development suggests that social and cultural contexts shape how individuals learn and emphasizes the importance of social interactions in promoting cognitive growth (Rowe & Wertsch, 2002; Jacobson et al., 2015; Kurt, 2020). Identified as an important component of the EE learning process, group interaction is thought to foster cooperation and collaboration skills important to solving environmental problems (Klein & Merritt, 1994; Stern et al., 2014; Jacobson et al., 2015). A systematic literature review of research studies that empirically evaluated the outcomes of EE programs found that many researchers credited program success to social engagement practices such as cooperative group work amongst students (Stern et al., 2014). Moreover, peer-to-peer interaction seems to be particularly effective for educating younger audiences about climate change and sustainability (de Vreede et al., 2014; Devine-Wright et al., 2004; Corner et al., 2015). However, group learning can be dependent upon trust, acceptance, support, and conflict management. The development of these elements can be

challenging on single-day field trips where educators have limited contact with students (Jacobson, 2015). By asking students to work together with their classmates, *group work* requires a greater level of vulnerability on the part of individual students. This approach may feel more socially risky for students from politically mixed contexts where an individual's perspective might conflict with the identities of their classmates. **Therefore, we hypothesized that *group work* would be linked to less positive outcomes for students from politically mixed contexts and more positive outcomes for students from both Democratic and Republican contexts.**

Play-based learning also requires trust, cooperation, and vulnerability for students to let their guards down and participate in games. Within politically mixed groups, play-based learning may lead to discomfort for those not pre-disposed to environmental messaging. Given that the subject matter of an EE program may already be counter-attitudinal for students from Republican contexts, these groups may perceive *play-based learning* as associated with their political out-group and feel that the extra vulnerability it requires is in further conflict with their identity. For example, many EE games ask learners to adopt animal personas as a way of building student empathy for nature. For students who have been regularly exposed to anti-environmentalist messages, this may feel like a silly game for tree-hugging environmentalists and not one that is congruent with their own identities. **Therefore, we hypothesized that *play-based learning* would be associated with less positive outcomes for students from both Republican and politically mixed contexts.**

Facts, Issues, and Advocacy

The knowledge deficit model suggests that providing people with more factual information should result in greater support for scientific issues; however, empirical research in science education and communication has shown that this model is incomplete (see Simis et al., 2016 for

discussion). Group attachments, such as political parties, are instrumental in explaining how individuals process new information or construct their attitudes and beliefs (Taber & Lodge, 2006). Although the middle school students in this study might still be developing their political group attachments, even only modestly partisan individuals still engage in motivated and identity-protective reasoning, processing new information in a way that serves their existing beliefs and maintains their group identity (Kahan, 2013; Kunda, 1990; Stern, 2018). As the cultural cognition thesis suggests, scientific facts are not enough to change people's minds when pre-existing beliefs or prior cultural commitments are involved (Kahan, 2010; Kahan et al., 2011; Stern, 2018).

Increased anti-intellectualist cues and skepticism of scientists, particularly amongst conservatives, may influence how students from more conservative Republican contexts respond to elements of science education commonly present in EE programs. For example, programs that ask students to *role play as scientists* (i.e., educator says something along the lines of "today, we're going to pretend to be scientists") may conflict with valued in-group identities of these students. Likewise, overly *fact-focused* EE programs may be insufficient at countering pre-existing beliefs or prior cultural commitments. **Therefore, we hypothesized that *fact-focused* programs and *scientist role play* would be associated with less positive outcomes for students from Republican contexts.** Meanwhile, students from Democratic contexts are likely already in agreement with the messaging of EE programs and are therefore less likely to respond negatively to *fact-focused* content. However, it is also possible that these students will find purely *fact-focused* programs less engaging, thus leading to less positive outcomes. Thus, we hold this hypothesis tentatively, as fact-focused programs may have little positive impact on any audience (Stern et al., 2014).

Given the ongoing politicization of environmental concerns, *issue-based* programs that focus on real-world, and sometimes local, environmental problems and programs that *advocate* for a specific viewpoint, policy, or action may be perceived as more politically contentious. **Therefore, we hypothesized that *issue-based* programs and those reflecting *advocacy* would be linked to less positive outcomes for students from Republican and politically mixed contexts. Meanwhile, we expected these approaches to produce more positive outcomes for students from Democratic contexts,** as pro-environmental messaging is likely already prevalent in their political milieu. Table 1 summarizes each of the key variables and hypotheses discussed above.

Table 1. Theoretical justification of programmatic characteristics related to sociopolitical context.

Observed program variable	Direction of hypothesis	Hypothetical explanation
Educator characteristics		
Eloquence - Extent to which the educator spoke clearly and articulately; the flow of the communication was smooth.	Republican: – Mixed: no effect Democratic: no effect	Anti-intellectual and anti-environmental cues from prominent Republican leaders may lead students from this context to negatively define educators as members of an out-group based on their degree of *eloquence* or their adoption of the *walking encyclopedia educator identity*, resulting in less positive outcomes. Given conservatives' emphasis on deference to authority, educators who assume an *authority figure identity* may be positively defined as in-group members by students from conservative Republican contexts (positive outcomes) than by students from more liberal Democratic contexts (less positive outcomes). *Verbal engagement*, such as putting students on the spot to answer questions or engage in dialogue, may feel threatening to students from Republican contexts given that they may be less predisposed to agree with core elements of EE programming (negative outcomes).
Educator identity: Walking encyclopedia - Focused on conveying a large amount of facts, often using jargon.	Republican: – Mixed: no effect Democratic: no effect	
Educator identity: Authority figure - Educator predominantly emphasized rules and/or authority to communicate.	Republican: + Mixed: no effect Democratic: –	
Verbal engagement - Educator asked questions or engaged students in dialogue.	Republican: – Mixed: no effect Democratic: no effect	
Group interaction		
Group work - Program required/explicitly asked students to work with others.	Republican: + Mixed: – Democratic: +	Social engagement practices such as cooperative *group work* may lead to more positive outcomes for students from Democratic and Republican contexts but may feel more socially risky for students from politically mixed contexts and thus contribute to less positive outcomes for these students. Given that the subject matter of an EE program may be counter-attitudinal for students from Republican contexts, allowing students to learn from peer interaction may be particularly important for these groups. *Play-based learning* may be perceived as an identity conflict for students from Republican contexts due to the need to adopt potentially counter-attitudinal roles. It may also lead to discomfort within politically mixed groups.
Play-based learning - Lesson actively engages students in games or competition as an intentional teaching technique.	Republican: – Mixed: – Democratic: no effect	

Facts, issues, and advocacy		
Scientist role play - Educator specifically asked the students to consider themselves within the role of "scientists" during the program.	Republican: – Mixed: no effect Democratic: +/no effect	Anti-intellectual and anti-environmental cues from political elites have contributed to science skepticism and anti-environmentalism largely amongst Republicans. Asking students to *role play as scientists*, using *advocacy* to favor a specific viewpoint, or *issue-based* programs that focus on real-world environmental problems may contribute to identity-threats for students from Republican contexts and therefore lead to less positive outcomes for these groups. *Issue-based* programs and *advocacy* also have the potential to be perceived as politically contentious and contribute to less positive outcomes for students from politically mixed contexts in which their peers may disagree with them. *Fact-focused* programs may be insufficient at countering pre-existing beliefs or prior cultural commitments for students from Republican contexts. Students from Democratic or other contexts may be largely unprovoked by purely *fact-focused* programs.
Advocacy – Instructor/program was clearly favoring a specific viewpoint, policy, or action as better than another	Republican: – Mixed: – Democratic: +	
Issue-based - Lesson focused on real-world environmental problems/issues, their consequences, and potential solutions.	Republican: – Mixed: – Democratic: +	
Fact-focused – Degree to which content that was conveyed was merely factual (devoid of deeper thought, consideration or emotions, values, or other non-factual considerations).	Republican: – Mixed: no effect Democratic: no effect	

Methods

Study Overview

This research is part of a larger study designed to explore the relationships between specific pedagogical approaches and student outcomes on EE-related field trips in the U.S. (see Stern et al., 2022; Dale et al., 2020; Lee et al., 2020; O'Hare et al., 2020). This study uses data collected from EE program observation, student participant questionnaires, and pre-existing databases. Student questionnaires provide the outcome measures; EE program observations provide the programmatic variables of interest; and pre-existing databases were used to create our measure of sociopolitical context and to identify the racial make-up and socioeconomic status of schools in our sample. These additional demographic variables have been found to be statistically related to student outcomes within the sample and are included here to contextualize the findings (Stern et al., 2022). Each measure is explained in more detail below, following a description of site selection and preceding a description of the analyses used to answer the research questions.

Site Selection

This study utilizes a pre-existing dataset from a larger study of single-day EE field trip programs for students in grades 5-8 across the U.S. Program providers included national parks, state and local parks, nature centers, botanical gardens, wildlife reserves, farms, public forests, science museums, and other environmental organizations. Programs were selected to maximize the diversity of program types and the socioeconomic contexts in which they took place. Ultimately, researchers observed 345 programs from 90 unique program providers across 24 states and Washington, D.C. between January and June 2018. For more details on sampling, see Dale et al. (2020).

Data Collection

Following extensive training and calibration on the measurement of each indicator (see Powell et al., in review), four pairs of researchers visited and collected data at 345 EE field trip programs for 5th to 8th graders between January and June of 2018. During each program, researchers observed and collected data on the quality and extent of more than 80 programmatic characteristics using quantitative scoring on a predesigned observation sheet. Observed programmatic characteristics included attributes related to the educator, participating student group, program type and organization, pedagogical approaches and techniques, and program context. These program characteristics were developed based on previous research and extensive literature review (Stern & Powell, 2013; Stern, Powell, Hill, 2014). The characteristics considered in the present study are described in Table 1. Immediately following each program, all attending students in grades 5-8 were invited to complete the EE21 survey (Powell et al., 2019) to assess their opinions of the program and its influence on them (Table 2). For more details on data collection, see Dale et al. (2020).

Table 2. Environmental Education Outcomes for the 21st Century (EE21) (Powell et al., 2019)

Environmental Education Outcomes for the 21st Century (EE21)		
Outcome	**Definition**	**Items**
Enjoyment	Positive evaluation of the experience	How would you rate the program on a scale from 0 to 10?
Place Connection	The development of appreciation for and positive personal relationships with the physical location and its story.	How much do you agree with the following statements? (anchors: not at all, some, totally) • Knowing this place exists makes me feel good. • I want to visit this place again. • I care about this place.
Learning	Knowledge regarding the interconnectedness and interdependence between human and environmental systems.	How much did you learn about each of the following things as a result of . . .? (anchors: nothing at all, a fair amount, a huge amount) • How different parts of the environment interact with each other. • How people can change the environment. • How changes in the environment can impact my life. • How my actions affect the environment.
Interest in Learning	Enhanced curiosity, increased interest in learning about science and the environment.	Did this . . . make you feel any <u>more interested</u> in any of the following things? (anchors: not at all, more interested much more interested) • Science. • How to research things I am curious about. • Learning about new subjects in school.
21st Century Skills	Critical thinking and problem solving, communication, and collaboration	How much did this . . . help you <u>improve</u> any of these skills? (anchors: not at all, a fair amount, a huge amount) • Solving problems. • Using science to answer a question. • Listening to other people's points of view. • Knowing how to do research.
Meaning/Self-Identity	A heightened sense of self-awareness, critical reflection, and purpose.	Did this . . . do any of the following things for you? (anchors: not at all, a fair amount, a huge amount) • Taught me something <u>that will be useful to me</u> in my future. • Really made me think. • Made me realize something I never imagined before. • Made me think differently about the choices I make in my life. • <u>Made me curious about something.</u>
Self-Efficacy	Belief in one's own ability to achieve one's goals and influence their environment.	Retrospective pre/post items (anchors: not at all, somewhat agree(d), strongly agree(d): • I believe in myself. • I feel confident I can achieve my goals. • I can make a difference in my community.
Environmental Attitudes	Sensitivity, concern, and positive dispositions towards the environment	Retrospective pre/post items (anchors: not at all, somewhat agree(d), strongly agree(d): • I feel it is important to take good care of the environment. • Humans are a part of nature, not separate from it.

		• I have the power to protect the environment.
Action orientation	Intentions to perform behaviors relevant to the program's content or goals	As a result of the program, do you intend to do anything differently in your life? (yes/no)
Environmental Stewardship	Motivations to perform stewardship-related behaviors.	Did this . . . make you any more likely to do any of the following things within the next year? (anchors: no more likely, somewhat more likely, way more likely) • Help to protect the environment. • Spend more time outside. • Make a positive difference in my community.
Collaboration	Motivation to collaborate more with others	Did this . . . make you any more likely to do any of the following things within the next year? (anchors: no more likely, somewhat more likely, way more likely) • Listen more to other people's points of view. • Cooperate more with my classmates.
School motivations	Motivation to work harder in school.	Did this . . . make you any more likely to do any of the following things within the next year? (anchors: no more likely, somewhat more likely, way more likely) • Work harder in school. • Pay more attention in class.

Measurement

Program outcomes

In-person post-experience surveys were administered to all student participants immediately after each observed program before leaving the site of their field trip. The **EE21 scale** was developed through an extensive collaborative process between EE professionals and researchers and statistical validation (see Powell et al., 2019 for details). Designed to measure self-reported changes in key components of environmental literacy resulting from programs, the EE21 scale consists of 10 equally weighted subscales, including learning, interest in learning, 21st century skills, personal meaning, self-efficacy, school motivations, positive youth development, place connection, environmental attitudes, and environmental stewardship (Table 2). Prior analyses of these data noted significant effects associated with an upward response bias for Latinx responses and significantly higher outcomes scores for fifth grade students (Stern et al., 2022). We controlled for grade level and race by group-mean-centering the EE21 outcome measure for each grade level (grades 5, 6, 7, 8) and group racial majority (majority White, majority Black, majority

Latinx, no racial majority). We removed programs with multigrade groups or groups of unknown racial majority from our analyses (see *Data cleaning & aggregation* as well as Stern et al., 2022 for details). Following group-mean-centering, the resulting overall mean for the group-mean-centered EE21 outcome score is zero. In effect, this process eliminates the influence of race and grade level in subsequent analyses.

Programmatic characteristics relevant to sociopolitical context

We examine the relationships between the ten program characteristics hypothesized above and included in Table 1 and the overall EE21 outcome index across different sociopolitical contexts. The quality and extent of these program characteristics were measured at each program in the sample through observations made by the research team. Observations of eight constructs (*eloquence, group work, verbal engagement, play-based, issue-based,* and *fact-focused)* were recorded on a 1-to-4 scale and four constructs (e*ducator identity walking encyclopedia* and *authority figure, scientist role play*, and *advocacy*) were recorded with binary measurement (presence/absence). Following the logic of calibration, discussed by Ragin (2008), as well as extensive pilot testing with the full research team, these 1-to-4 scales allowed for easy categorization of observations by considering whether the observed program *more* or *less* reflected the programmatic characteristic in question (the difference between a 2 and 3 on the scale). It also maximized scale length, which helps detect meaningful difference between programs and their characteristics. Detailed descriptions and operationalization of all 12 variables can be found in Table 1 in the Appendix.

Following Distefano et al. (2021), we collapsed any scoring categories with less than 2% of the total observations (or 5 observed programs within a sociopolitical subgroup). For four characteristics (*play-based, issue-based, verbal engagement,* and *group work*), this eliminated two

points on the scale, resulting in binary constructs indicating either presence or absence of the characteristic. For two characteristics (*eloquence* and *fact-focused*), this resulted in a 3-point scale in which the characteristic was minimally, moderately, or extremely represented on the program. After collapsing, some characteristics (*eloquence* and *issue-based*) had insufficient program observations within certain sociopolitical subgroups. In these cases, we removed that subgroup from further analysis.

Determining racial majority, grade level, & socioeconomic status of visiting groups

The *racial majority* of student groups (> 50%) was recorded as: majority White, majority Black, majority Hispanic, or no majority, based on school-level data from various internet sources (see Stern et al., 2022).

Grade levels were reported by both the on-site educators and on student questionnaires. Most groups were comprised of a single grade. Because of the need to control for grade and race (see Stern et al., 2022), multigrade groups and groups whose racial majority could not be determined were excluded from our final analyses.

We use the percentage of students with access to free and reduced lunch prices within a school (*% FRPL*) as a single indicator of socioeconomic status. While socioeconomic status reflects a far broader array of circumstances, % FRPL reflects the general context of a school's attendance zone in terms of the concentration of low-income students (NCES, 2020). Nationwide, approximately 58% of public-school students participated in the National School Lunch program that provides free and reduced lunch prices (Bauman & Cranney 2020; USDA Food and Nutrition Service, 2020). NCES divides public schools into categories by FRPL eligibility where < 25% is low-poverty; 25.1 to 50% is mid-low poverty; 50.1 to 75% is mid-high poverty; and > 75% is high-

poverty. For the purposes of this study, we consolidated categories, coding schools with > 50% FRPL as poorer schools and schools with ≤ 50% FRPL as wealthier schools.

Determining sociopolitical context

Our goal was to create a measure of sociopolitical context for each attending group in our sample based on votes from the 2016 Presidential, Senate, and House elections that could be attributed to a school attendance zone (SAZ). We removed all private, charter, and choice schools from the overall sample because they do not possess geographic boundaries comparable to public school attendance boundaries (see *Data cleaning & aggregation*). We used a combination of the 2016 Presidential, Senate, and House elections, rather than midterm or state-level elections, because Presidential election years draw a higher level of public attention and greater participation from voters, making them more likely to play a role in the political socialization of youth (Wolak, 2009; Sears & Valentino, 1997). Because the two major parties (Democrats and Republicans) are contested in all regions of the U.S. at the same time, Presidential elections represent a universal "measure of the electoral character of an area's population" as "voters face roughly the same stimuli" in this race (Johnston et al., 2016, p. 5; Gimpel & Schuknecht, 2002, p. 329). Meanwhile, Senate and House down-ticket races of the same election year provide an additional measure of an area's sociopolitical context in that strongly Republican or strongly Democratic areas can be expected to produce more straight-ticket voting (Kinsella et al., 2021). Precincts, sometimes called voting districts, are smaller divisions within a county. They are created by state or local governments for the purpose of conducting elections and provide the most precise micro-scale measure of partisan voting behavior[1] (Bureau of the Census, 1994; Kinsella et al. 2015).

[1] Using precinct-level election returns provides us with a sharper representation of students' immediate sociopolitical environment than if we were to use school district or county-level data, which produce coarser illustrations of partisan turnout and may obscure variation between schools within the same district (Kitchens, 2020; Kinsella et al., 2015; Myers, 2013).

Dasymetric mapping allows us to reapportion 2016 precinct-level election returns within SAZs by using landcover data as a proxy for population (Amos et al., 2017).

Precinct selection procedures

The majority of school attendance zone (SAZ) shapefiles were obtained from the National Center for Education Statistics (NCES, 2016). If the SAZ shapefile for a particular school was not in the NCES database, we contacted school district offices and state and county GIS offices to obtain it. If the SAZ was not available through NCES or one of these other sources, the school was dropped from the sample (see *Data cleaning & aggregation*).

Next, we obtained precinct shapefiles for all the states in our sample. For the majority of states, precinct shapefiles containing election returns for the 2016 Presidential, Senate, and House races were obtained from the Harvard Dataverse Voting and Election Science Team (Voting and Election Science Team, 2018) or the Metric Geometry and Gerrymander Group's GitHub, "MGGG States" (MGGG, 2019-2020). If precinct-level election result shapefiles were not available through either of these sources, we contacted state- or county-level GIS departments or departments of elections to obtain the shapefiles. We were successful in obtaining precincts for all sample areas. We then separated the precincts that intersected with the SAZs using the "extract by location" tool in QGIS. This produced a shapefile containing all precincts that touched or overlapped the SAZs in our sample.[2]

Addressing the polygon overlay problem – Precincts & SAZs

Although precinct-level election returns can be reassigned to SAZs, these two zonal systems are often spatially incongruent. Geographers refer to this as the polygon overlay problem

[2] In instances where precinct shapefiles did not include election returns for all three races, we matched precinct-specific codes from the shapefile with election returns from the MIT Election Data & Science Lab (2018). In these instances, election returns were appended to the GIS shapefile using the precinct-specific codes prior to performing the "extract by location" tool.

– a situation in which one set of geographic areas does not perfectly correspond to another (Amos et al., 2017; Saporito et al., 2007). In this study, the precincts did not perfectly correspond to the SAZs (Figure 1). Simply reassigning the full weight of the precinct's election returns to the SAZ if only a portion of the precinct is within the SAZ could produce inaccurate estimates of sociopolitical context.

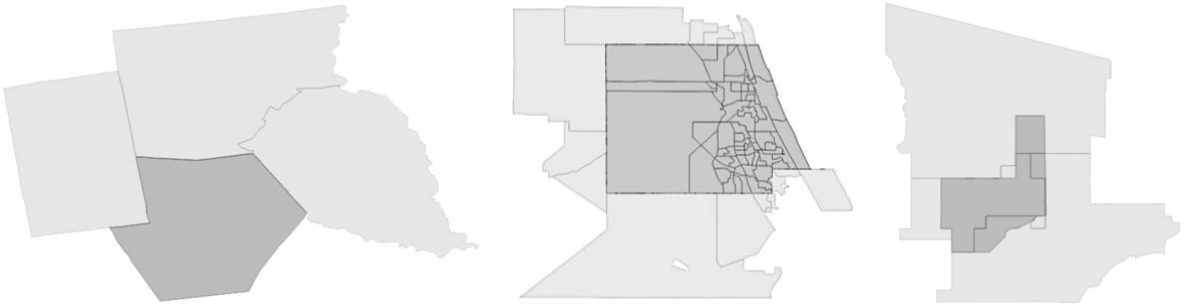


Figure 1. Examples demonstrating varying degress of the polygon overlay problem. (SAZs in dark gray, precincts in light gray).

To address this challenge of reallocating data across misaligned geography, researchers have developed a variety of interpolation methods (Amos et al., 2017; Saporito et al., 2007). Amos and colleagues (2017) examined three methods of addressing the polygon overlay problem and found dasymetric mapping to be the best method to accurately apportion population in localized geographies split by precincts. Dasymetric mapping uses ancillary data, in this case the National Land Cover Database (NLCD), to estimate where population is geographically located and construct more accurate weights for areal weighting. The NLCD is a highly detailed and nationally consistent raster database that assigns land to one of 16 usage classes at a resolution of thirty square meters (Dewitz, 2019; Amos et al., 2017). Although the study by Amos and colleagues showed variation in the optimal weights for individual states, the average absolute error created by using the state-ideal weights versus the nationally pooled weights was relatively low. Thus, they recommend applying dasymetric mapping using the NLCD by means of pooled weights to address the polygon overlay problem.

We employed this method of dasymetric mapping using landcover data to approximate the distribution of the electorate in order to proportionally weight the election returns of each precinct within a SAZ (Figure 2). First, we used the "intersection" tool in QGIS to extract the overlapping portions of features in the input layer (precinct shapefiles) and the overlay layer (SAZ shapefiles), resulting in two layers for each SAZ: 1) entire precincts intersecting the SAZ and 2) clipped precinct areas falling within the SAZ. For each of these layers, we used the "zonal histogram" tool in QGIS to append fields representing the area of each unique landcover type from the 2016 NLCD raster layer (specifically the open space, low intensity, medium intensity, and high intensity developed land types) contained within the precincts (Dewitz, 2019). Using the pooled weights developed by Amos et al. (2017), we assigned a weight of 1.00 to low intensity development, 0.85 to medium intensity development, and 0.05 to open space, while high-intensity development and non-developed land types were both weighted 0. This measure of development represents a unitless proxy for population. It may seem counterintuitive to use a weight of 0 for high-intensity development; however, in this context, high-intensity development commonly represents business and industrial districts with limited residential populations (Amos et al., 2017).

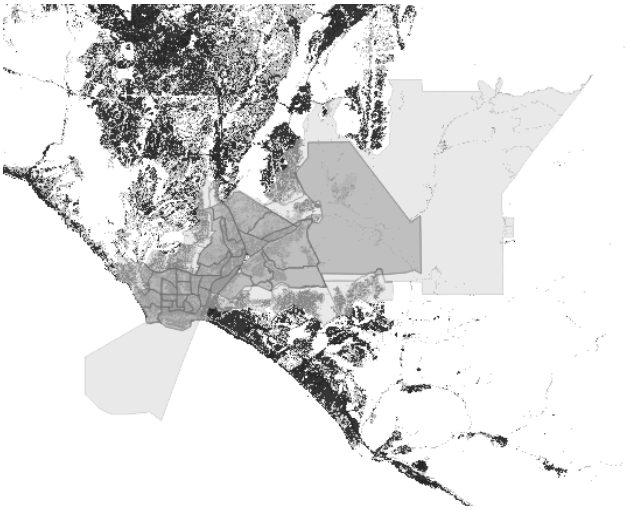


Figure 3. An example demonstrating the dasymetric mapping process using NLCD data. Along with the SAZ and precinct shapefiles, each type of developed land is displayed in varying shades of gray. White represents areas with no developed lands (i.e., forests, wetlands, cropland, etc.).

Calculating partisanship & assigning sociopolitical context

The final step was to distribute votes from the 2016 Presidential, Senate, and House elections based on the dasymetric mapping process described above. Precinct-level election returns provided the raw Republican vote and combined two-party vote in each race. Using the two-party vote eliminates votes for third party candidates, resulting in a more precise measure of partisanship than using total votes cast (Gelman, 2010; Ambrosius, 2015; Kinsella et al., 2015; Myers, 2013, McKee & Teigen, 2009). For each precinct, we used all the of the available election data with one exception: races where a Democrat or a Republican ran unopposed by a member of the opposite party were eliminated, as these would produce an inaccurate measure of partisanship.

We assigned the ratio of Republican to total two-party votes within each precinct to each map segment, weighted appropriately, within each SAZ. The reapportioned votes for each precinct were then aggregated to the SAZ-level and used to calculate the average Republican percentage using one or more of the available races. We refer to this measure as *average percent Republican* and use it to establish cut-points described below.

There is limited research establishing precise definitions to describe an area as being either "conservative" or "liberal." A review of political geography literature indicates that methodology is not limited to a single approach (Ambrosius, 2015; Morrill et al., 2007; Johnston et al., 2016, Kinsella et al., 2015; McKee & Teigen, 2009). Bishop (2008) uses landslide counties, defined by a presidential candidate's victory of 20 percentage points or more, whereas Abramowitz (2010) defined landslide states by a difference of at least 10 percentage points between Republican and Democrat presidential candidates. We use both measures – the 10-point landslide and the 20-point landslide – for our analyses. Using the 10-point landslide, we divided our sample into three subgroups: *Democrat-leaning* (< 45%), *Republican-leaning* (> 55%), *mixed* (45-55%). Using the

20-point landslide, we again divided our sample into three subgroups: *strongly Democratic* (< 40%), *strongly Republican* (> 60%), and *mixed* (40-60%). While not a perfect match, we assume Republican-leaning and strongly Republican areas are generally more conservative and Democrat-leaning and strongly Democratic areas are generally more liberal (Levendusky, 2009).

Data cleaning & aggregation

This data set was drawn from a larger study of 345 programs. Data cleaning procedures on the larger data set included removing invalid responses and screening for multivariate outliers, as described in Stern et al. (2022). The data for this study were limited to programs attended by public school groups of a single grade and known racial majority. We removed 83 programs with non-public school groups or for which the SAZ was not available. To allow for group-mean-centering of the EE21 outcome, we removed another 16 programs that were either with multigrade groups or groups of unknown racial identity. Our resulting final sample for this study included 235 programs provided by 65 organizations across 114 schools in 22 states (Table 3 & 4).

Table 3: Data cleaning of programs

Reason for removal	Programs removed	Programs remaining
Initial sample	0	345
Validity screening (Stern et al., 2022)	11	334
Non-public school/SAZ unavailable	83	251
Multigrade/Unknown racial majority	16	235
Total	**110**	**235**

Following data cleaning, individual survey responses were aggregated to the program level to match grade level, racial majority, socioeconomic status, urbanity, and sociopolitical context of the attending group, which all exist at the program level. The EE21 outcome score thus represents the total scale mean across all students who attended a specific program. To test the validity of aggregating to the program level, we calculated the ICC (1) and ICC (2), which were 0.21 and 0.78 respectively. This indicates that most of the variance exists at the group level rather than the individual level and that aggregation is thus valid (Woehr et al., 2015; Stern et al., 2022).

Analyses

We first describe the sample by reporting frequencies of programs, providers, schools, and states across sociopolitical contexts and explore relationships between sociopolitical context and socioeconomic status, race, and urbanity (see NCES categories defined in Provasnik et al., 2007). We also report frequencies of program characteristics observed across the 10- and 20-point landslide samples.

To address the first research question, we compare mean outcomes for each sociopolitical context using a one-way ANOVA with post hoc analyses while controlling for grade and race. This allows us to determine if EE programs tend to be more or less effective for middle school students from different sociopolitical contexts using both the 10- and 20-point landslides.

To address the second research question, we combine sociopolitical context and socioeconomic status to divide the sample into six categories with poorer and wealthier subgroups of each sociopolitical context. We then compare mean differences in EE21 outcomes using a one-way ANOVA with post hoc analyses while controlling for grade and race. This allows us to determine if the interaction between sociopolitical context and socioeconomic status produces different outcomes for middle school students from different groups.

To address the third research question, we perform a series of two-way ANOVAs to examine how relationships between program characteristics and EE21 outcomes differ across sociopolitical contexts while controlling for grade and race. This allows us to analyze the main effect of the program characteristic on the EE21 outcome, as well as the interaction effect between characteristics and sociopolitical context. We report both statistically significant ($p < 0.05$) and

marginally significant ($p < 0.10$) findings.[3] We then compare mean differences in EE21 outcomes within sociopolitical subgroups for each program characteristic using independent samples t-tests (binary variables) and one-way ANOVAs (3-point variables) while controlling for grade and race.

Results

Sample distribution

Table 4 reports sample frequencies for programs, providers, schools, and states by sociopolitical context. Examining the distribution of programs across sociopolitical contexts using the 10-point landslide, 46% of programs served students from Democrat-leaning contexts, 34% from Republican-leaning contexts, and 20% from mixed contexts. Using the 20-point landslide, 40% of programs served students from strongly Democratic contexts, 25% from strongly Republican contexts, and 35% from mixed contexts.

Table 4. Sample frequencies by sociopolitical context using 3 cut-points.

	10-point landslide			**20-point landslide**		
	Democrat-leaning	Mixed	Republican-leaning	Strongly Democratic	Mixed	Strongly Republican
# Programs (235)	108	48	79	95	82	58
# Providers (65)	37	17	26	32	27	18
# Schools (114)	53	24	37	44	44	26
# States (22)	20	10	16	18	15	11

Note: (total *n* in sample)

Demographic variables

Table 5 displays descriptive statistics for sociopolitical context and socioeconomic status. Across all 235 programs, the *average percent Republican* ranged from 9.3% to 78.2% with a mean of 46.1%, equal to the national Republican percentage of the two-party vote in the 2016

[3] Given the small sample sizes and extensive cleaning of multivariate outliers in the data prior to embarking on these analyses, we have generally selected to not remove outliers in these analyses, as we consider them to be meaningful data rather than abnormal or spurious observations. The only exception was the *issue-based* variable, which originally failed the normality assumption of the two-way ANOVA but passed after the removal of one outlier.

presidential election (The New York Times, 2017). Free and reduced-price lunch statistics were available for 231 of the visiting school groups and the proportion of eligible students ranged from 7% to 96.2% with a mean of 57.5% (Table 5), similar to the national average of 58% in 2018.

Table 5. Descriptive statistics for sociopolitical context & socioeconomic status.

	Mean	**Std. Dev.**	**Min.**	**Max.**
Average percent Republican	46.1	17.8	9.3	78.2
%FRPL (socioeconomic status)	57.5	24.1	7.0	96.2

As we anticipated, there were relationships between groups' sociopolitical context and socioeconomic status, race, and urbanity. In short, participants from Republican contexts tended to be Whiter, wealthier, and live in more suburban or rural areas, whereas participants from Democratic areas tended to be more racially diverse, urban, and of lower socioeconomic status (see Appendix Tables 2-4). All subsequent analyses eliminate the effects of grade level and race through group-mean-centering of the dependent variable, EE21.

Programmatic characteristics

Table 6 reports the frequencies of programmatic characteristics by sociopolitical context using the 10- and 20-point landslides following variable collapsing procedures. Using the 10-point landslide, the *eloquence* variable had a limited sample size in the sociopolitically mixed subgroup; therefore, we excluded this subgroup from the analysis. Both the *eloquence* and *issue-based* variables had limited sample sizes in the strongly Republican subgroup; therefore, we were unable to perform analyses or draw any meaningful conclusions for these variables using the 20-point landslide. The original, uncondensed observations can be found in the Appendix (Table 5 & 6).

Table 6. Frequencies of programmatic characteristics by sociopolitical context after collapsing variables.

	Frequencies %, (n)								
	10-point Landslide					20-point Landslide			
	Total	**1**	**2**	**3**		**Total**	**1**	**2**	**3**
Fact-focused	235	20.4% (48)	59.6% (140)	20.0% (47)		235	20.4% (48)	59.6% (140)	20.0% (47)
Dem.-leaning	*46.0% (108)*	*18.5% (20)*	*65.7% (71)*	*15.7% (17)*	*Strongly Dem.*	*40.4% (95)*	*15.8% (15)*	*68.4% (65)*	*15.8% (15)*
Mixed	*20.4% (48)*	*33.3% (16)*	*50% (24)*	*16.7% (8)*	*Mixed*	*34.9% (82)*	*34.1% (28)*	*45.1% (37)*	*20.7% (17)*
Rep.-leaning	*33.6% (79)*	*15.2% (12)*	*57% (45)*	*27.8% (22)*	*Strongly Rep.*	*24.7% (58)*	*8.6% (5)*	*65.5% (38)*	*25.9% (15)*
Eloquence	**Total**	**1**	**2**	**3**		**Total**	**0**	**1**	
	235	6.8% (16)	87.2% (205)	6.0% (14)		235	6.8% (16)	93.2% (219)	
Dem.-leaning	*46.0% (108)*	*7.4% (8)*	*87.0% (94)*	*5.6% (6)*	*Strongly Dem.*	*40.4% (95)*	*7.4% (7)*	*92.6% (88)*	
Mixed	*20.4% (48)*	*2.1% (1)*	*91.7% (44)*	*6.3% (3)*	*Mixed*	*34.9% (82)*	*6.1% (5)*	*93.9% (77)*	
Rep.-leaning	*33.6% (79)*	*8.9% (7)*	*84.8% (67)*	*6.3% (5)*	*Strongly Rep.*	*24.7% (58)*	*6.9% (4)*	*93.1% (54)*	
Play-based	**Total**	**0**	**1**			**Total**	**0**	**1**	
	235	72.3% (170)	27.7% (65)			235	72.3% (170)	27.7% (65)	
Dem.-leaning	*46.0% (108)*	*66.7% (72)*	*33.3% (36)*		*Strongly Dem.*	*40.4% (95)*	*63.2% (60)*	*36.8% (35)*	
Mixed	*20.4% (48)*	*89.6% (43)*	*10.4% (5)*		*Mixed*	*34.9% (82)*	*87.8% (72)*	*12.2% (10)*	
Rep.-leaning	*33.6% (79)*	*69.6% (55)*	*30.4% (24)*		*Strongly Rep.*	*24.7% (58)*	*65.5% (38)*	*34.5% (20)*	
Issue-based*	**Total**	**0**	**1**			**Total**	**0**	**1**	
	234	88.5% (207)	11.5% (27)			234	88.5% (207)	11.5% (27)	
Dem.-leaning	*46.2% (108)*	*86.1% (93)*	*13.9% (15)*		*Strongly Dem.*	*40.4% (95)*	*88.4% (84)*	*11.6% (11)*	
Mixed	*20.5% (48)*	*85.4% (41)*	*14.6% (7)*		*Mixed*	*34.9% (82)*	*85.4% (70)*	*14.6% (12)*	
Rep.-leaning	*33.3% (78)*	*93.6% (73)*	*6.4% (5)*		*Strongly Rep.*	*24.7% (57)*	*93.0% (53)*	*7.0% (4)*	
Verbal engagement	**Total**	**0**	**1**			**Total**	**0**	**1**	
	235	37.0% (87)	63.0% (148)			235	37.0% (87)	63% (148)	
Dem.-leaning	*46.0% (108)*	*34.3% (37)*	*65.7% (71)*		*Strongly Dem.*	*40.4% (95)*	*34.7% (33)*	*65.3% (62)*	
Mixed	*20.4% (48)*	*35.4% (17)*	*64.6% (31)*		*Mixed*	*34.9% (82)*	*42.7% (35)*	*57.3% (47)*	
Rep.-leaning	*33.6% (79)*	*41.8% (33)*	*58.2% (46)*		*Strongly Rep.*	*24.7% (58)*	*32.8% (19)*	*67.2% (39)*	
Group work	**Total**	**0**	**1**			**Total**	**0**	**1**	
	235	72.8% (171)	27.2% (64)			235	72.8% (171)	27.2% (64)	
Dem.-leaning	*46.0% (108)*	*84.3% (91)*	*15.7% (17)*		*Strongly Dem.*	*40.4% (95)*	*85.3% (81)*	*14.7% (14)*	
Mixed	*20.4% (48)*	*60.4% (29)*	*39.6% (19)*		*Mixed*	*34.9% (82)*	*69.5% (57)*	*30.5% (25)*	
Rep.-leaning	*33.6% (79)*	*64.6% (51)*	*35.4% (28)*		*Strongly Rep.*	*24.7% (58)*	*56.9% (33)*	*43.1% (25)*	
Advocacy	**Total**	**0**	**1**			**Total**	**0**	**1**	
	235	72.3% (170)	27.7% (65)			235	72.3% (170)	27.7% (65)	
Dem.-leaning	*46.0% (108)*	*71.3% (77)*	*28.7% (31)*		*Strongly Dem.*	*40.4% (95)*	*69.5% (66)*	*30.5% (29)*	
Mixed	*20.4% (48)*	*75.0% (36)*	*25.0% (12)*		*Mixed*	*34.9% (82)*	*76.8% (63)*	*23.2% (19)*	
Rep.-leaning	*33.6% (79)*	*72.2% (57)*	*27.8% (22)*		*Strongly Rep.*	*24.7% (58)*	*70.7% (41)*	*29.3% (17)*	
Scientist role play	**Total**	**0**	**1**			**Total**	**0**	**1**	
	235	66.0% (155)	34.0% (88)			235	66.0% (155)	34.0% (88)	
Dem.-leaning	*46.0% (108)*	*65.7% (71)*	*34.3% (37)*		*Strongly Dem.*	*40.4% (95)*	*69.5% (66)*	*30.5% (29)*	
Mixed	*20.4% (48)*	*60.4% (29)*	*39.6% (19)*		*Mixed*	*34.9% (82)*	*59.8% (49)*	*40.2% (33)*	

Rep.-leaning	*33.6% (79)*	*69.6% (55)*	*30.4% (24)*	*Strongly Rep.*	*24.7% (58)*	*69.0% (40)*	*31.0% (18)*
ID: Walking encyc.	**Total**	**0**	**1**		**Total**	**0**	**1**
	235	72.8% (171)	27.2% (64)		235	72.8% (171)	27.2% (64)
Dem.-leaning	*46.0% (108)*	*68.5% (74)*	*31.5% (34)*	*Strongly Dem.*	*40.4% (95)*	*68.4% (65)*	*31.6% (30)*
Mixed	*20.4% (48)*	*75.0% (36)*	*25.0% (12)*	*Mixed*	*34.9% (82)*	*72.0% (59)*	*28.0% (23)*
Rep.-leaning	*33.6% (79)*	*77.2% (61)*	*22.8% (18)*	*Strongly Rep.*	*24.7% (58)*	*81.0% (47)*	*19.0% (11)*
ID: Authority figure	**Total**	**0**	**1**		**Total**	**0**	**1**
	235	73.6% (173)	26.4% (62)		235	73.6% (173)	26.4% (62)
Dem.-leaning	*46.0% (108)*	*77.8% (84)*	*22.2% (24)*	*Strongly Dem.*	*40.4% (95)*	*77.9% (74)*	*22.1% (21)*
Mixed	*20.4% (48)*	*75.0% (36)*	*25.0% (12)*	*Mixed*	*34.9% (82)*	*76.8% (63)*	*23.2% (19)*
Rep.-leaning	*33.6% (79)*	*67.1% (53)*	*32.9% (26)*	*Strongly Rep.*	*24.7% (58)*	*62.1% (36)*	*37.9% (22)*

*Removed outlier for normality assumption violation

Research Question 1

Are EE programs equally effective for middle school students (grades 5-8) from different sociopolitical contexts?

Table 7 displays the results of a one-way ANOVA comparing EE21 outcome scores across sociopolitical contexts using the 10- and 20-point landslides, controlling for grade and race. There were no significant differences in EE21 outcomes for students from different sociopolitical contexts using the 10-point landslide; however, using the more hyper-partisan 20-point landslide, groups from strongly Republican contexts had significantly more positive EE21 outcomes. Eta-squared effect size analysis indicated a small effect size ($\eta^2 = 0.03$).

Table 7. One-way ANOVA by sociopolitical context of visiting groups with Dunnett's C posthoc tests for EE21 outcomes, controlling for grade and race.

	Sociopolitical context					
	Democratic	**Mixed**	**Republican**	**Test statistic**	**p**	**η^2**
10-point landslide (n)	*(108)*	*(48)*	*(79)*			
EE21	-0.07	0.05	0.07	F: 0.882	0.415	0.008
20-point landslide (n)	*(95)*	*(82)*	*(58)*			
EE21	-0.09[a]	-0.05[a]	0.23[b]	F: 3.63	0.028	0.030

Eta-squared effect size: .01 = small effect, 0.06 = medium effect, & 0.14 = large effect

Research Question 2

Does sociopolitical context interact with socioeconomic status to produce different outcomes for different groups of students?

Table 8 displays the results of a one-way ANOVA comparing EE21 outcomes scores across poorer and wealthier sociopolitical subgroups using the 10- and 20-point landslides while controlling for grade and race. Using both the 10- and 20-point landslides, groups from wealthier Democratic contexts had significantly less positive EE21 outcomes. Eta-squared effect size analyses indicated large effect sizes in both the 10-point ($\eta^2 = 0.182$) and 20-point landslides ($\eta^2 = 0.194$). Thus, combining socioeconomic and sociopolitical considerations of context provides a much clearer picture of differential impacts of EE programs than considering voting patterns alone.

Table 8. One-way ANOVA by sociopolitical context and socioeconomic status of visiting groups with Dunnett's C posthoc tests for EE21 outcomes, controlling for grade and race.

	Sociopolitical context by socioeconomic status								
	Democratic		**Mixed**		**Republican**				
	Wealthy	**Poor**	**Wealthy**	**Poor**	**Wealthy**	**Poor**	**Test statistic**	**p**	**η^2**
10-point landslide (n)	*(28)*	*(76)*	*(15)*	*(33)*	*(36)*	*(43)*			
EE21	-0.84[a]	0.20[b]	0.13[b]	0.01[b]	-0.03[b]	0.15[b]	Welch: 12.279	< 0.001	0.182
20-point landslide (n)	*(26)*	*(65)*	*(26)*	*(56)*	*(27)*	*(31)*			
EE21	-0.83[a]	0.18[b]	-0.31[ab]	0.07[b]	0.25[b]	0.20[b]	Welch: 11.717	< 0.001	0.194

Eta-squared effect size: .01 = small effect, 0.06 = medium effect, & 0.14 = large effect

Research Question 3

What EE programmatic characteristics most influence positive learning outcomes for middle school students from different sociopolitical contexts?

We first performed bivariate analyses between program characteristics and outcomes across the entire sample to determine the main effects. Then, we used two-way ANOVAs to examine interaction effects between the program characteristics and sociopolitical context to determine whether certain characteristics show different relationships with learning outcomes for

students from different sociopolitical contexts.[4] Finally, we examined within-group effects to determine whether program characteristics had statistically significant relationships with outcomes *within* each sociopolitical subgroup (Republican, Democrat, or mixed).

The main effect analyses showed that three approaches demonstrated statistically significant relationships with EE21 outcomes across the entire sample. Educators who adopted the *walking encyclopedia* identity and programs that were mostly *fact-focused* were associated with less positive outcomes, while programs with higher degrees of *verbal engagement* were associated with more positive outcomes, all with small effect sizes (eta-squared = 0.05; $p < 0.05$). Interaction effects were observed for six approaches, indicating that the effect of the program characteristic was dependent on the sociopolitical context of the group. In other words, the sociopolitical context influenced the relationship between the approach and the EE21 outcome. These interaction effects are displayed in Figure 4.

For *eloquence,* we were only able to examine Democrat-leaning and Republican-leaning groups within the 10-point landslide due to sample size limitations. Our findings suggest that groups from Republican-leaning contexts displayed less positive outcomes following participation in programs with highly eloquent educators. The two-way ANOVA effect size analysis suggests a small influence of sociopolitical context on the relationship between *eloquence* and the EE21 outcome ($\eta^2 = 0.04$).

Due to sample size limitations, we were also only able to examine *group work* and *issue-based* learning using the 10-point landslide. For students from Republican-leaning contexts, *group*

[4] Although we found that socioeconomic status interacts with sociopolitical context to influence outcomes for different groups, our limited sample sizes preclude us from subdividing the data by socioeconomic status and sociopolitical context concurrently and maintaining sufficient statistical power for examining relationships within each. Because our hypotheses were about variance across sociopolitical contexts (not socioeconomic ones), we did not explore interactions across socioeconomic contexts alone.

work and *issue-based* learning were associated with marginally more positive outcomes. Meanwhile, students from mixed sociopolitical contexts exhibited less positive outcomes on programs with *issue-based* learning. Each interaction demonstrated only small effect sizes (η^2= 0.04).

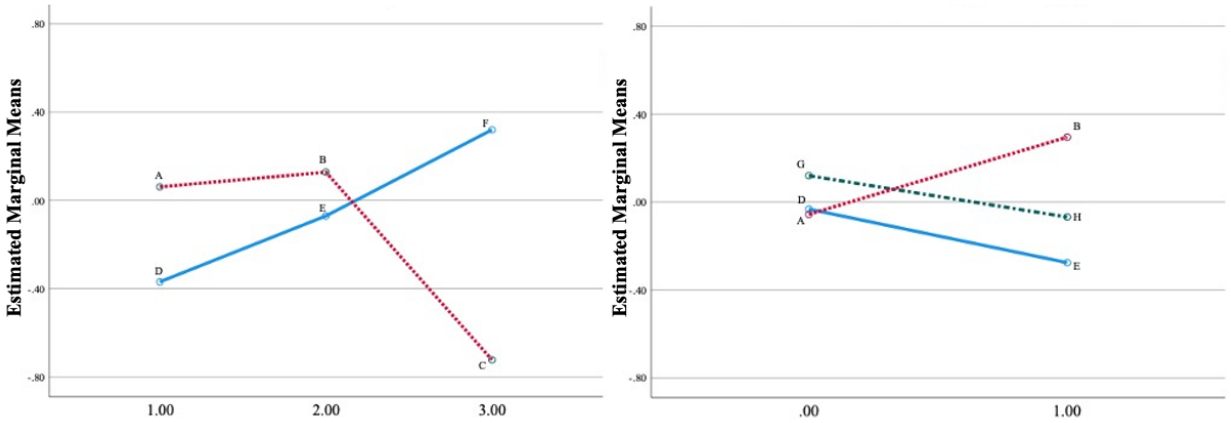
Play-based learning was associated with less positive outcomes for students from Republican contexts with a medium effect size of the interaction, indicating a meaningful difference between sociopolitical contexts (η^2= 0.06 – 0.08).

Fact-focused programs were negatively related with EE21 outcomes in Democratic contexts. However, *fact-focused* EE displayed less linear results for students from Republican contexts. For these students, outcomes were most positive at moderate levels of fact-sharing and least positive for the lowest and highest degrees of fact-sharing. The results of the two-way ANOVA were inconsistent, however, between the two cut-points of the study (10-point and 20-point landslides). Similarly, while a general pattern appeared to exist, statistical analyses yielded inconsistent findings for educators who adopted the *authority figure* identity. See Appendix Table 7 for full results of two-way ANOVA analyses.

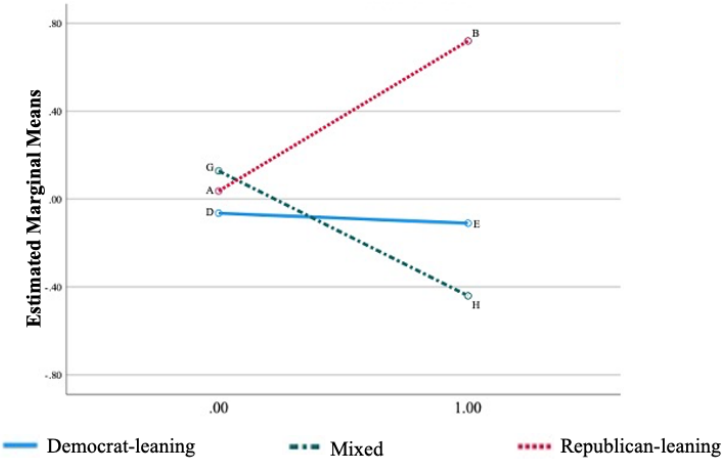
Figure 4. Student EE21 outcomes as a function of programmatic characteristic and sociopolitical context, controlling for grade and race.

Eloquence: 10-point Landslide	
Interaction effect	$F_{(2, 181)} = 3.65$, $p = 0.028$, $\eta^2 = 0.04$
Within-group effect	C < A, B; $t = -2.32$, $p = 0.023$, *Cohen's d* = -1.07

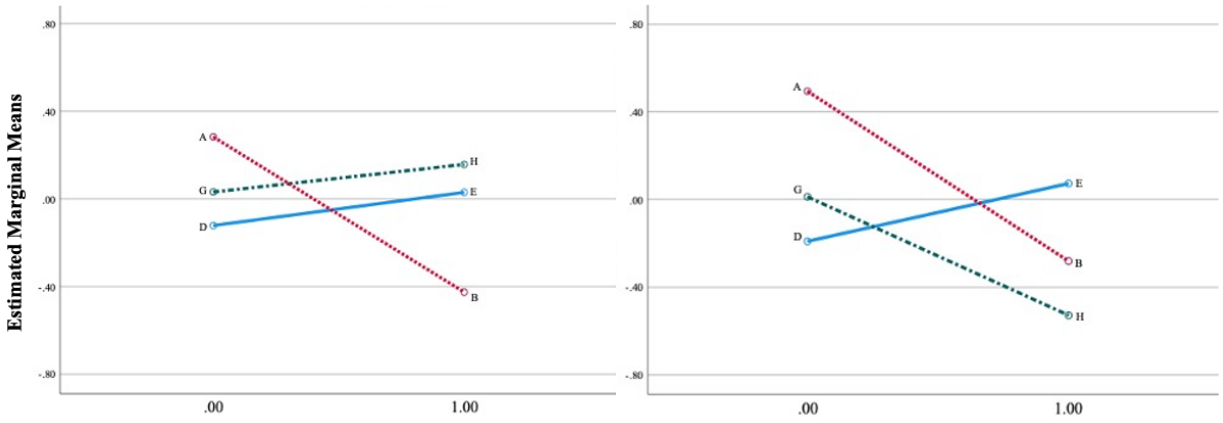
Group Work: 10-point landslide	
Interaction effect	$F_{(2, 229)} = 3.09$, $p = 0.048$, $\eta^2 = 0.03$
Within-group effect	B > A; $t = -1.87$, $p = 0.065$, *Cohen's d* = -0.44



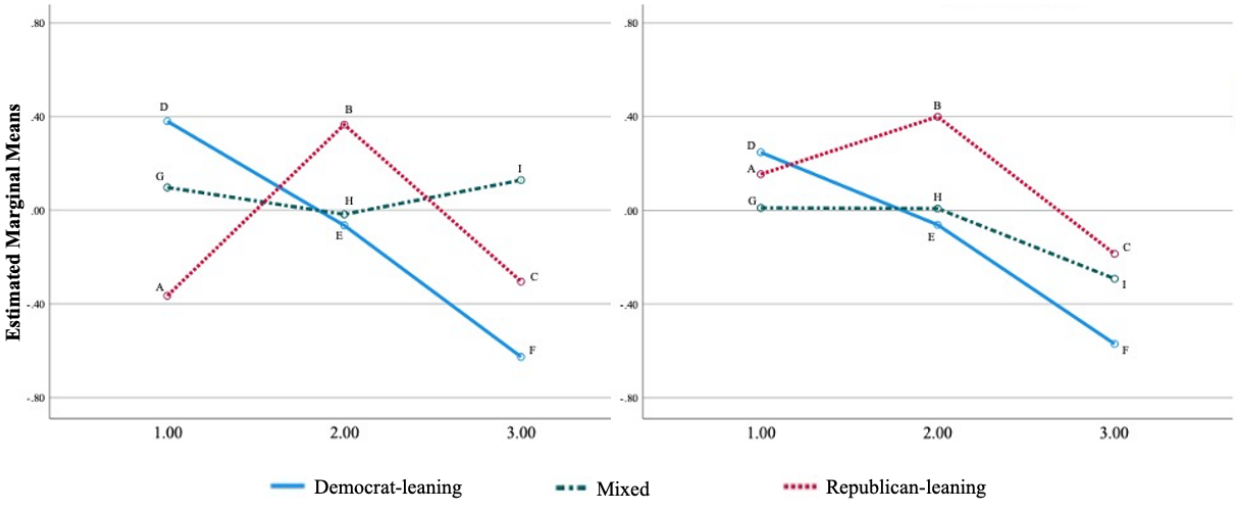
Issue-based: 10-point Landslide	
Interaction effect	$F_{(2, 228)} = 3.69$, $p = 0.027$, $\eta^2 = 0.03$
Within-group effect	B > A; $t = -1.86$, $p = 0.067$, *Cohen's d* = -0.86 H < G; $t = 2.12$, $p = 0.039$, *Cohen's d* = 0.87



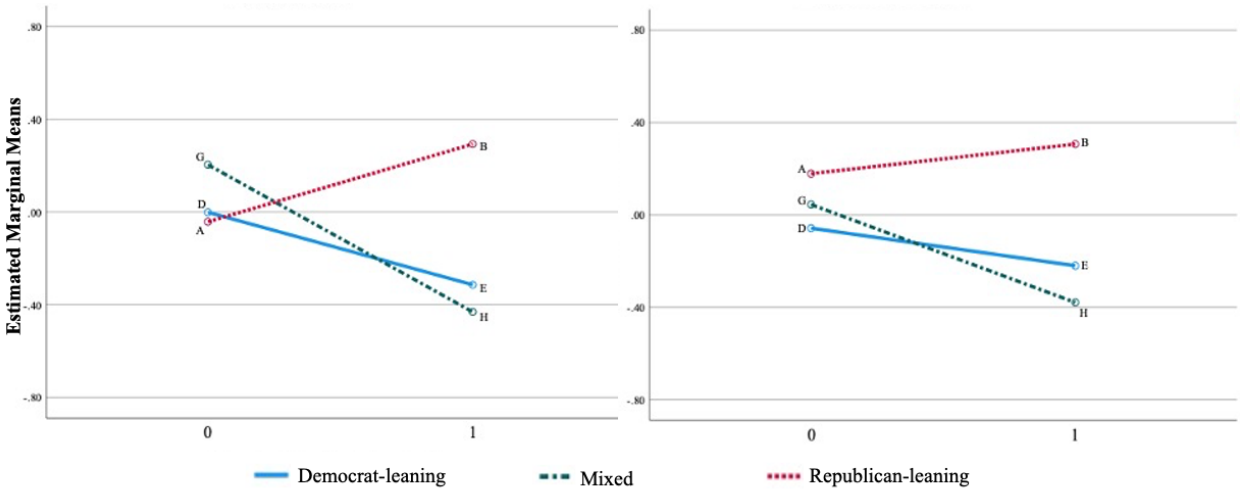
Play-based		
	10-point Landslide	**20-point Landslide**
Interaction effect	$F_{(2, 229)} = 7.18$, $p < 0.001$, $\eta^2 = 0.06$	$F_{(2, 229)} = 9.87$, $p < 0.001$, $\eta^2 = 0.08$
Within-group effect	B < A; $t = 3.89$, $p < 0.001$, *Cohen's d* = 0.95	B < A; $t = 3.91$, $p < 0.001$, *Cohen's d* = 1.08 E > D, $t = -1.73$, $p = 0.087$, *Cohen's d* = -0.37 H < G; $t = 2.25$, $p = 0.027$, *Cohen's d* = 0.76



Fact-focused		
	10-point Landslide	**20-point Landslide**
Interaction effect	$F_{(4, 226)} = 5.46$, $p < 0.001$, $\eta^2 = 0.09$	No significant finding
Within-group effect	B > A, C; $F_{(2, 76)} = 8.42$, $p < 0.001$, $\eta^2 = 0.18$ F < E < D; $F_{(2, 105)} = 9.74$, $p < 0.001$, $\eta^2 = 0.16$	B > C; $F_{(2, 55)} = 3.10$, $p = 0.053$, $\eta^2 = 0.10$ F < E, D; $F_{(2,92)} = 5.436$, $p = 0.006$, $\eta^2 = 0.11$



Educator ID: Authority Figure		
	10-point Landslide	**20-point Landslide**
Interaction effect	$F_{(2, 229)} = 6.13$, $p = 0.003$, $\eta^2 = 0.05$	No significant finding
Within-group effect	B > A; $t = -1.75$, $p = 0.084$, *Cohen's d* = -0.42 E < D; $t = 1.83$, $p = 0.070$, *Cohen's d* = 0.42 H < G; $t = 3.04$, $p = 0.004$, *Cohen's d* = 1.01	H < G; $t = 2.27$, $p = 0.026$, *Cohen's d* = 0.60



Discussion

We hypothesized that we would see differences between groups from different sociopolitical contexts because adolescents are exposed to the dominant political messages in their own communities and are at a stage in life where they may be adopting politically based social identities (Bishop, 2008; Connell, 1971; Lewis-Beck et al., 2008; Campbell et al., 1960). Controlling for grade and race, analyses associated with our first two research questions revealed that student groups from wealthier Democratic contexts had significantly less positive EE21 outcomes compared to other groups following EE school field trips. Our findings suggest that while EE is producing positive outcomes for most participants, programs are seemingly less effective for groups from wealthier Democratic contexts on average. While our analyses of interaction effects suggest some differences in the relationships between program characteristics and outcomes, most differences between sociopolitical subgroups appeared to be minor, with one exception: play-based approaches were less positive for students from Republican contexts. The

analyses above suggest a medium effect size for this program characteristic. We discuss each of these findings in turn.

This study revealed less positive outcomes for students from wealthier Democratic contexts than all other sociopolitical contexts following participation in EE field trips. There are both theoretical and practical explanations for this finding. Given their familiarity with the kinds of pro-environmental messaging and experiences typical of EE programs, students from wealthier Democratic contexts may be less influenced by a one-day field trip due to a lack of novelty. These students may also have a higher baseline level of environmental literacy (as measured by EE21) and thus may experience a 'ceiling effect' (i.e., limited potential for improvement in a positive direction). As this study only measured self-reported changes in outcomes, this effect would be otherwise undetectable. Similarly, students from other sociopolitical contexts may have greater opportunity for change resulting from EE field experiences. Prior research has demonstrated that groups from poorer schools tend to exhibit more positive outcomes resulting from EE school field trips (Stern et al., 2022). While it is possible that pro-environmental messages may be less ubiquitous for students from poorer Democratic contexts, being of lower socioeconomic status likely enhances the novelty of these experiences and thus overpowers the effect of being Democratic in this sense.

Although some program characteristics were associated with differing outcomes for students from different sociopolitical contexts, small effect sizes and inconsistencies between the 10- and 20-point landslides suggest that most of these finding may have been spurious. The most consistent finding was that *play-based* approaches were linked to less positive outcomes for students from Republican contexts. Social interaction, such as play, is thought to be important for promoting cognitive growth and fostering cooperation and collaboration skills (Kurt, 2020; Klein

& Merritt, 1994; Stern et al., 2014; Jacobson et al., 2015). However, social and cultural contexts shape how individuals learn and play-based learning requires trust, cooperation, and vulnerability for students to let their guards down and participate in games (Rowe & Wertsch, 2002; Nieto & Bode, 2008). The development of these elements can be challenging on single-day field trips where educators have limited contact with students (Jacobson, 2015). Given that the subject matter of an EE program may already be counter-attitudinal for students from Republican contexts, these groups may perceive play-based learning as associated with their political out-group and feel that the extra vulnerability it requires is in further conflict with their identity. For example, our observations of play-based programs included activities like role-playing, camouflage competitions, and games designed to teach about the water cycle and geology. Some games asked students to pretend to be water droplets or to adopt the animal personas of a snowshoe hare or a mouse as a way of building student empathy for nature. For students who may be regularly exposed to anti-environmentalist messages, these games may feel incongruent with their own social identities.

Although we expected *advocacy* and *scientist role play* to be associated with less positive outcomes for groups from Republican contexts, due to anti-environmental cues and science skepticism amongst conservatives, these program traits were not significantly associated with any outcomes. Prior research on identity development suggests that adolescence is a time when social identities and group attachments are still forming (Klimstra et al., 2010). Because their worldviews and political ideologies remain more malleable and are developing alongside their knowledge of environmental issues (Stevenson et al., 2014), youth may be more open to the inclusion of science-based identities and action-based appeals on EE programs. Moreover, these programmatic

elements could be introduced in various ways, some of which might pose identity threats and others that might help to contextualize important human-environment linkages.

The present moment represents a unique opportunity for the field of EE to play a role in lessening the political polarization of environmental issues. Today's youth generally hold more pro-environmental views than adults and are seemingly less polarized in their views of environmental issues (Pew Research Center, 2020; Parker et al., 2019; Funk & Hefferon, 2019). Our findings convey additional good news for the field. First, audiences for which environmental concerns may be counter-attitudinal, such as students from Republican contexts, did not exhibit less positive outcomes following participation in EE programs. Second, reaching these students should not require a drastic change in approach from EE providers. However, we found that students from wealthier Democratic contexts were predisposed to less positive outcomes; therefore, we recommend that providers continue to be conscious of their audiences, particularly when working with groups from this context, as these students may benefit from a different approach.

Limitations and future research

Limitations of our study are primarily attributable to small subsamples that were not statistically representative of the entire U.S. and a lack of variability in some key variables of interest. Future research could aim to conduct larger and more representative samples of each sociopolitical context.

Results for *eloquence*, *group work*, and *issue-based* were inconclusive due to small sample sizes, particularly within the 20-point Republican subgroup. For *eloquence*, the issue was a lack of variability – largely due to the communicative abilities of educators, but also perhaps due to our conceptualization and operationalization of this measure. We also intended to examine *multiple*

viewpoints and *group reflection* based on their theoretical importance; however, we almost never observed high degrees of their implementation on the EE programs within the sample.

Although groups from wealthier Democratic contexts appear to be quite different from their peers, sample size limitations prevented us from subdividing the sample with the level of granularity required to determine which program characteristics most influenced EE21 outcomes for this group (as opposed to others). Future research could continue to examine which program characteristics lead to better outcomes for students from wealthier Democratic contexts, as these students may benefit from a different approach.

References

Abramowitz, A. I. (2010). Transformation and polarization: The 2008 presidential election and the new American electorate. *Electoral Studies, 29*(4), 594–603. https://doi.org/10.1016/j.electstud.2010.04.006.

Abramowitz, A.I. & Saunders, K.L. (1998). Ideological realignment in the U.S. electorate. *The Journal of Politics, 60*(3), 634-652. https://www.journals.uchicago.edu/doi/10.2307/2647642.

Abramowitz, A.I. & Saunders, K.L. (2006). Exploring the bases of partisanship in the American electorate: Social identity vs. ideology. *Political Research Quarterly, 59*(2), 175-187. http://journals.sagepub.com/doi/10.1177/106591290605900201.

Abramowitz, A.I. & Saunders, K.L. (2008). Is polarization a myth? *The Journal of Politics, 70*(2), 542-555. https://www.journals.uchicago.edu/doi/10.1017/S0022381608080493.

Ambrosius, J.D. (2015). Blue city…red city? A comparison of competing theories of core county outcomes in U.S. presidential elections, 2000-2012. *Journal of Urban Affairs, 38*(2), 169-195. DOI: 10.1111/juaf.12184.

Amos, B., McDonald, M.P., & Watkins, R. (2017). When boundaries collide constructing a national database of demographic and voting statistics. *Public Opinion Quarterly, 81*(special issue), 385-400. doi:10.1093/poq/nfx001.

Ardoin, N.M., Bowers, A.W., Wyman Roth, N., & Holthuis, N. (2018). Environmental Education and K-12 student outcomes: A review and analysis of research. *The Journal of Environmental Education, 49*(1), 1-17. DOI: 10.1080/00958964.2017.1366155.

Associated Press-NORC Center for Public Affairs Research (AP-NORC*). Public opinion and the environment: The nine types of Americans*. AP-NORC: Chicago, IL, USA, 2015.

Bafumi, J., & Shapiro, R.Y. (2009). A new partisan voter. *Journal of Politics, 71*(1): 1-24.

Barber, M. & Pope, J.C. (2019). Does party trump ideology? Disentangling party and ideology in America. *American Political Science Review, 113*(1), 38-54. doi:10.1017/S0003055418000795.

Barberá, P. (2020). Social media, echo chambers, and political polarization. Pp. 34-55. In *Social Media and Democracy: The State of the Field, Prospects for Reform.* Persily, N. and Tucker, J.A. (Eds.). Cambridge University Press.

Bauman, K. & Cranney, S. (2020). School enrollment in the United States: 2018. Population Characteristics. Current Population Reports. P20-584. US Department of Commerce. US Census Bureau.

Bishop, B. (2008). *The big sort: Why the clustering of like-minded America is tearing us apart.* Mariner Books.

Bureau of the Census. (1994). Voting Districts. In Torrieri, N.K. (Ed.) *Geographic Areas Reference Manual*. (pp. 14-1 – 14-18). U.S. Department of Commerce.

Campbell, B.A. (1980). A theoretical approach to peer influence in adolescent socialization. *American Journal of Political Science, 24*(2), 324-344.

Campbell, A., Converse, P.E., Miller, W.E., & Stokes, D.E. (1960). *The American Voter*. Wiley.

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39*(5), 752-766.

Cohen, G.L. (2003). Party over policy: The dominating impact of group influence on political beliefs. Journal of *Personality and Social Psychology, 85*(5), 808-822. http://doi.apa.org/getdoi.cfm?doi=10.1037/0022-3514.85.5.808.

Connell, R.W. (1971). *The child's construction of politics*. Melbourne University Press.

Corner, A., Roberts, O., Chiari, S., Völler, S., Mayrhuber, E.S., Mandl, S., & Monson, K. (2015). How do young people engage with climate change? The role of knowledge, values, message framing, and trusted communicators. *WIREs Clim Change, 2015*(6), 523-534. doi: 10.1002/wcc.353.

Dale, R.G., Powell, R.B., Stern, M.J., & Garst, B.A. (2020). Influence of the natural setting on environmental education outcomes. *Environmental Education Research.* DOI: 10.1080/13504622.2020.1738346.

de Vreede C., Warner A., & Pitter R. (2014). Facilitating youth to take sustainability actions: the potential of peer education. *Journal of Environmental Education, 2014*(45), 37–56. 37-56, DOI: 10.1080/00958964.2013.805710

Devine-Wright P., Devine-Wright H., & Fleming P. (2004). Situational influences upon children's beliefs about global warming and energy. *Environmental Education Research, 2004*(10), 493–506. DOI: 10.1080/1350462042000291029

Dewitz, J. (2019). National Land Cover Database (NLCD) 2016 Products: U.S. Geological Survey data release, https://doi.org/10.5066/P96HHBIE.

Dinas, E. (2014). Why does the apple fall far from the tree? How early political socialization prompts parent-child dissimilarity. *British Journal of Political Science, 44*(4), 827-852. https://www.cambridge.org/core/product/identifier/S0007123413000033/type/journal_article.

Dunlap, R.E. (2019, April 5). Partisan polarization on the environment grows under Trump. *Gallup.* Retrieved from http://www.news.gallup.com.

Dunlap, R.E., Xiao, C., & McCright, A.M. (2001). Politics and environment in America: Partisan and ideological cleavages in public support for environmentalism. *Environmental Politics, 10*(4), 23-48. https://doi.org/10.1080/714000580.

Dunlap, R.E., McCright, A.M., Yarosh, J.H. (2016). The political divide on climate change: Partisan polarization widens in the U.S. *Environment 58*(5), 4-23.

Esposo, S. R., Hornsey, M. J., & Spoor, J. R. (2013). Shooting the messenger: Outsiders critical of your group are rejected regardless of argument quality. *British Journal of Social Psychology, 52*(2), 386–395. https://doi.org/10.1111/bjso.12024.

Fielding, K. S., & Hornsey, M. J. (2016). A social identity analysis of climate change and environmental attitudes and behaviors: Insights and opportunities. *Frontiers in Psychology, 7,* 121. https://doi.org/10.3389/fpsyg.2016.00121.

Funk, C. & Hefferon, M. (2019, November 25). U.S. public views on climate and energy. *Pew Research Center*. Retrieved from https://www.pewresearch.org.

Gauchat, G. (2012). Politicization of science in the public sphere: A study of public trust in the United States, 1974-2010. *American Sociological Review, 77*(2), 167-187. DOI: 10.1177/0003122412438225

Gelman, A. (2010). *Red state, blue state, rich state, poor state: Why Americans vote the way they do.* Princeton University Press.

Gilberstadt, H. & Daniller. A. (2020). *Liberals make up the largest share of Democratic voters, but their growth has slowed in recent years.* Pew Research Center, January 17, www.pewresearch.org/fact-tank/2020/01/17/liberals-make-up-largest-share-ofdemocratic-voters/.

Gimpel, J.G. & Schuknecht, J.E. (2002). Reconsidering political regionalism in the American states. *State Politics and Policy Quarterly, 2*(4), 325-352.

Gimpel, J.G., Lay, J.C., & Schuknecht, J.E. (2003). *Cultivating democracy: Civic environments and political socialization in America.* Brookings Institution Press.

Grossman, M. & Hopkins, D.A. (2016). *Asymmetric politics: Ideological Republicans and group interest Democrats.* Oxford University Press.

Haidt, J. (2012). *The righteous mind: Why good people are divided by politics and religion*. Vintage Books.

Hofstadter, R. (1963). *Anti-intellectualism in American life.* Alfred A. Knopf.

Hollweg, K. S., Taylor, J. R., Bybee, R. W., Marcinkowski, T. J., McBeth, W. C., & Zoido, P. (2011). *Developing a framework for assessing environmental literacy.* Washington, DC: North American Association for Environmental Education. Available at http://www.naaee.net.

Hopkins, D.J. (2018). *The increasingly United States: How and why American political behavior nationalized.* The University of Chicago Press.

Hornsey, M. J., Oppes, T., & Svensson, A. (2002). "It's OK if we say it, but you can't": Responses to intergroup and intragroup criticism. *European Journal of Social Psychology, 32*(3), 293–307.

Huckfeldt, R., Mondak, J.J., Craw, M., Morehouse Mendez, J. (2005). Making sense of candidates: Partisanship, ideology, and issues as guides to judgement. *Cognitive Brain Research, 23*(1), 11-23. https://linkinghub.elsevier.com/retrieve/pii/S0926641005000133.

Iozzi, L.A. (1989). What research says to the educator: Part one: Environmental education and the affective domain. *The Journal of Environmental Education, 20*(3), 3-9. DOI: 10.1080/00958964.1989.9942782.

Jacobson, G.C. (2012). The electoral origins of polarized politics: Evidence from the 2010 Cooperative Congressional Election Study. *American Behavioral Scientist, 56*(12), 1612-1630. DOI: 10.1177/0002764212463352

Jacobson, S.K., McDuff, M.D., & Monroe, M.C. (2015). *Conservation education and outreach techniques.* Oxford University Press.

Jennings, M.K., Niemi, R.G., 1974. *The political character of adolescence: The Influence of families and schools.* Princeton University Press.

Jennings, M.K. & Niemi, R.G. (1981). *Generations and politics: A panel study of young adults and their parents.* Princeton University Press.

Jennings, M.K. (2002). Generation units and the student protest movement in the United States: an intra- and intergenerational analysis. *Political Psychology, 23*(2), 303-324.

Johnston, R., Manley, D., Jones, K. (2016). Spatial polarization of presidential voting in the United States, 1992-2012: The "Big Sort" revisited. *Annals of the American Association of Geographers, 106*(5), 1047-1062. http://www.tandfonline.com/doi/full/10.1080/24694452.2016.1191991.

Johnston, R., Manley, D., Jones, K., Rohla, R. (2020). The geographical polarization of the American electorate: A country of increasing electoral landslides? *GeoJournal, 85*(1), 187-204. http://link.springer.com/10.1007/s10708-018-9955-3.

Jost, J.T. (2017). Asymmetries abound: Ideological differences in emotion, partisanship, motivated reasoning, social network structure, and political trust. *Journal of Consumer Psychology, 27*(4), 546-553. http://doi.wiley.com/10.1016/j.jcps.2017.08.004.

Kahan, D.M. (2010). Fixing the communications failure. *Nature 463*, 296-7.

Kahan, D.M. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgement and Decision Making, 8*, 407-424.

Kahan, D.M., Donald, B., Jenkins-Smith, H. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research, 14*(2), 147-74. doi: 10.1080/13669877.2010.511246.

Kahan, D.M., Peters, E., Wittlin, M., Slovic, P., Larrimore Ouellette, L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change*, *2*, 732-735. DOI: 10.1038/NCLIMATE1547.

Kahn, P.H. & Kellert, S.R. (2002). *Children and nature: Psychological, sociocultural, and evolutionary investigations* (p. 117–151). MIT Press.

Keating, A. (2016). Are cosmopolitan dispositions learn at home, at school, or through contact with others? Evidence from young people in Europe. *Journal of Youth Studies, 19*(3), 338-357. DOI: 10.1080/13676261.2015.1072617.

Kinder, D. R., & Kalmoe, N. P. (2017). *Neither liberal nor conservative: Ideological innocence in the American public.* University Of Chicago Press.

Kinsella, C., McTague, C., & Raleigh, K.N. (2015). Unmasking geographic polarization and clustering: A micro-scalar analysis of partisan voting behavior. *Applied Geography, 62*, 404-419. https://linkinghub.elsevier.com/retrieve/pii/S0143622815001071.

Kinsella, C., McTague, C., & Raleigh, K. (2021). Closely and deeply divided: Purple counties in the 2016 presidential election. *Applied Geography, 127*(2021), 102386. https://doi.org/10.1016/j.apgeog.2021.102386.

Kitchens, K. (2020). Partisan politics and public education: Finding the formula for (electoral) success. *State Politics & Policy Quarterly, 00*(0), 1-25. DOI: 10.1177/1532440020933205

Kitschelt, H.P. & Rehm, P. (2019). Secular partisan realignment in the United States: The socioeconomic reconfiguration of white partisan support since the New Deal era. *Politics & Society, 47*(3), 425-479. https://doi.org/10.1177/0032329219861215.

Klein, E.S. & Merritt, E. (1994). Environmental education as a model for constructivist teaching. *The Journal of Environmental Education Research, 25*(3), 14-21. DOI: 10.1080/00958964.1994.9941953

Klimstra, T. A., Hale III, W. W., Raaijmakers, Q. A., Branje, S. J., & Meeus, W. H. (2010). Identity formation in adolescence: Change or stability? *Journal of Youth and Adolescence, 39*(2), 150-162.

Kohlberg, L. (1971). Stages of moral development. *Moral Education, 1*(51), 23-92.

Krishna, A. & Sokolova, T. (2017). A focus on partisanship: How it impacts voting behaviors and political attitudes. *Journal of Consumer Psychology, 27*(4), 537-545. http://doi.wiley.com/10.1016/j.jcps.2017.07.005.

Kroger, J. (2006). *Identity Development: Adolescence through Adulthood*. Sage Publications.

Kunda, Z. (1990). The case for motivated reasoning. *Psychological Bulletin, 108*(3), 480-498.

Kurt, S. (2020, July 11). *Lev Vygotsky - Sociocultural Theory of Cognitive Development*. Educational Technology. https://educationaltechnology.net/lev-vygotsky-sociocultural-theory-of-cognitive-development/.

Lee, H. & Stern, M.J. (2020). Do pre-visit preparation and post-visit activities improve student outcomes on field trips? *Environmental Education Research*, 1-19. https://doi.org/10.1080/13504622.2020.1765991.

Levendusky, M. (2009). *The partisan sort: How liberals became Democrats and conservatives became Republicans*. The University of Chicago Press.

Levin, M.L. (1961). Social climates and political socialization. *The Public Opinion Quarterly, 25*(4), p. 596-606.

Lewis-Beck, M., Jacoby, W.G., Norpoth, H., Weisberg, H.F. (2008). *The American Voter Revisited.* The University of Michigan Press.

MacKuen, M. & Brown, C. (1987). Political context and attitude change. *American Political Science Review, 81*(2), 471-490. https://www.cambridge.org/core/product/identifier/S0003055400194468/type/journal_article.

Mason, L. (2018). Ideologues without issues: The polarizing consequences of ideological identities. *Public Opinion Quarterly, 82*(S1), 866-887. https://academic.oup.com/poq/article/82/S1/866/4951269.

Massanari, A.L. & Howard, P.N. (2011). Information technologies and omnivorous news diets over three U.S. presidential elections. *Journal of Information Technology & Politics, 8*, 177-198. DOI: 10.1080/19331681.2011.541702.

McCright, A.M., Xiao, C., & Dunlap, R.E. (2014). Political polarization on support for government spending on environmental protection in the USA, 1974-2012. *Social Science Research 48*(2014), 251-260. http://dx.doi.org/10.1016/j.ssresearch.2014.06.008.

McCright, A.M. & Dunlap, R.E. (2011). The politicization of climate change and polarization in the American public's views of global warming, 2001-2010. *The Sociological Quarterly, 52*(2), 155-194. DOI: 10.1111/j.1533-8525.2011.01198.x.

McKee, S.C. & Teigen, J.M. (2009). Probing the reds and blues: Sectionalism and voter location in the 2000 and 2004 U.S. presidential elections. *Political Geography 28*, 282-295. doi:10.1016/j.polgeo.2009.11.004.

McKeown-Ice, R. & Dendinger, R. (2000). Socio-political-cultural foundations of environmental education. *The Journal of Environmental Education, 31*(4), 37-45. https://doi.org/10.1080/00958960009598650.

Merkley, E. (2020). Anti-intellectualism, populism, and motivated resistance to expert consensus. *Public Opinion Quarterly, 84*(1), 24-48. doi:10.1093/poq/nfz053.

Metric Geometry and Gerrymandering Group (MGGG), (2019-2020), "MGGG States", https://github.com/mggg-states.

MIT Election Data and Science Lab, 2018, "U.S. House of Representatives Precinct-Level Returns 2016", https://doi.org/10.7910/DVN/PSKDUJ, Harvard Dataverse, V11, UNF:6:bfp8ORgdwp2WQ3jM3kSeGw== [fileUNF]

MIT Election Data and Science Lab, 2018, "U.S. President Precinct-Level Returns 2016", https://doi.org/10.7910/DVN/LYWX3D, Harvard Dataverse, V11, UNF:6:hQyVqHW+vTFnAW2jYIOy/Q== [fileUNF]

MIT Election Data and Science Lab, 2018, "U.S. Senate Precinct-Level Returns 2016", https://doi.org/10.7910/DVN/NLTQAD, Harvard Dataverse, V11, UNF:6:A+p0f16nhvXGTW10ThPX2w== [fileUNF]

Morrill, R., Knopp, L., & Brown, M. (2007). Anomalies in red and blue: Exceptionalism in American electoral geography. *Political Geography, 26*(5), 525-553. https://linkinghub.elsevier.com/retrieve/pii/S0962629807000418.

Motta, M. (2018). The dynamics and political implications of anti-intellectualism in the United States. *American Politics Research, 46*(3), 465-498. DOI: 10.1177/1532673X17719507.

Myers, A.S. (2013). Secular geographical polarization in the American South: The case of Texas, 1996-2010. *Electoral Studies, 32*(1), 48-62. https://linkinghub.elsevier.com/retrieve/pii/S0261379412001229.

National Center for Education Statistics (NCES) 2016. The Boundary Collection, https://nces.ed.gov/programs/edge/SABS. Accessed May 9, 2021.

National Center for Education Statistics (NCES) 2020. Fast Facts: Public school students eligible for free or reduced-price lunch. https://nces.ed.gov/fastfacts/display.asp?id=898. Accessed December 29, 2020.

Nieto, S., & Bode, P. (2008). *Affirming diversity: The sociopolitical context of multicultural education*. Allyn & Bacon.

Nisbet, E.C., Cooper, K.E., Garrett, R.K. (2015). The partisan brain: How dissonant science messages lead conservatives and liberals to (dis)trust science. *The ANNALS of the American Academy of Political and Social Science, 658*(1), 36-66. http://journals.sagepub.com/doi/10.1177/0002716214555474.

O'Hare, A., Powell, R.B., Stern, M.J., & Bowers, E.P. (2020). Influence of educator's emotional support behaviors on environmental education student outcomes. *Environmental Education Research, 26*(11), 1556-1577. DOI: 10.1080/13504622.2020.1800593.

Pampel, F.C. & Hunter, L.M. (2012). Cohort change, diffusion, and support for environmental spending in the United States. *American Journal of Sociology, 118*(2), 420-448.

Parker, K., Graf, N., & Igielnik, R. (2019, January 7). Generation Z looks a lot like millennials on key social and political issues. *Pew Research Center*. Retrieved from https://www.pewsocialtrends.org.

Pettifor, H. (2012). Do parents affect the early political prioritization of nature in their children? *ISER Working Paper Series, No. 2012-11*, University of Essex, Institute of Social and Economic Research (ISER), Colchester.

Pew Research Center (2020). *As Economic Concerns Recede, Environmental Protection Rises on the Public's Policy Agenda*. Washington, DC: Pew Research Center. Available online at: https://www.pewresearch.org/politics/2020/02/13/as-economic-concerns-recede-environmental-protection-rises-on-the-publics-policy-agenda/ (accessed March 29, 2021).

Pew Research Center (2021). *Beyond red vs. blue: The political typology.* Washington, DC: Pew Research Center. Available online at: https://www.pewresearch.org/politics/2021/11/09/beyond-red-vs-blue-the-political-typology-2/.

Piaget, J. (1972) *The Psychology of Intelligence.* Totowa: Littlefield.

Pichler, F. (2011). Cosmopolitanism in a global perspective: An international comparison of open-minded orientations and identity in relation to globalization. *International Sociology, 27*(1), 21-50. DOI: 10.1177/0268580911422980

Powell, R.B., Stern, M.J., Frensley, B.T., & Moore, D. (2019). Identifying and developing crosscutting environmental education outcomes for adolescents in the twenty-first century (EE21). *Environmental Education Research.* https://doi.org/10.1080/13504622.2019.1607259

Provasnik, S., KewalRamani, A., Coleman, M.M., Gilbertson, L., Herring, W., and Xie, Q. (2007). *Status of Education in Rural America* (NCES 2007-040). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Rigney, D. (1991). Three kinds of anti-intellectualism: Rethinking Hofstadter. *Sociological Inquirty, 61*(4), 434-451.

Rogers, E.M. (1995). *Diffusions of innovations.* (Fourth Edition). The Free Press.

Rohla, R., Johnston, R., Jones, K., & Manley, D. (2018). Spatial scale and the geographical polarization of the American electorate. *Political Geography, 65*, 117-122. https://linkinghub.elsevier.com/retrieve/pii/S096262981730238X.

Rowe, S.M. & Wertsch, J.V. (2002). Vygotky's model of cognitive development. In: U. Goswami (ed.), *Blackwell handbook of childhood cognitive development*, pp. 538-554. Blackwell Publishers.

Saporito, S., Chavers, J.M., Nixon, L.C., & McQuiddy, M.R. (2007). From here to there: Methods of allocating data between census geography and socially meaningful areas. *Social Science Research, 36*(2007), 897-920. doi:10.1016/j.ssresearch.2006.05.004.

Schild, R. (2016). Environmental citizenship: What can political theory contribute to environmental education practice? *The Journal of Environmental Education, 47*(1), 19-34. https://doi.org/10.1080/00958964.2015.1092417.

Sears, D.O. & Valentino, N.A. (1997). Politics matters: political events as catalysts for preadult socialization. *American Political Science Review, 91*, 45-65.

Simis, M.J., Madden, H., Cacciatore, M.A., & Yeo, S.K. (2016). The lure of rationality: Why does the deficit model persist in science communication? *Public Understanding of Science, 25*(4), 400-414. DOI: 10.1177/0963662516629749.

Slimani, M., Lange, J., & Hakansson, M. (2021). The political dimension in environmental education curricula: Towards an integrative conceptual and analytical framework. *Environmental Education Research, 27*(3), 354-365. https://doi.org/10.1080/13504622.2021.1879023

Stern, M.J. (2018). *Social science theory for environmental sustainability*. Oxford University Press.

Stern, M.J., & Powell, R.B. (2013). What leads to better visitor outcomes in live interpretation? *Journal of Interpretation Research, 18*(2).

Stern, M. J., Powell, R. B., & Hill, D. (2014). Environmental education program evaluation in the new millennium: what do we measure and what have we learned? *Environmental Education Research, 20*(5), 581-611. https://doi.org/10.1080/13504622.2013.838749.

Stern, M.J. & Powell, R.B., & Frensley, B.T. (2022). Environmental education, age, race, and socioeconomic class: An exploration of differential impacts of field trips on adolescent youth in the United States. *Environmental Education Research*. DOI: 10.1080/13504622.2021.1990865.

Stevenson, K. T., Peterson, M. N., Bondell, H. D., Moore, S. E., and Carrier, S. J. (2014). Overcoming skepticism with education: Interacting influences of worldview and climate change knowledge on perceived climate change risk among adolescents. *Clim. Change* 126, 293–304. doi: 10.1007/s10584-014-1228-7

Sussell, J. (2013). New support for the big sort hypothesis: An assessment of partisan geographic sorting in California, 1992-2010. *PS: Political Science & Politics, 50*(4), 768-773. https://doi.org/10.1017/S1049096513001042.

Taber, C.S., & Lodge, M. (2006). Motivated skepticism in the evaluation of political beliefs. *American Journal of Political Science, 50*(3), 755-769.

Tajfel, H., & Turner, J. (1979). An Integrative Theory of Intergroup Conflict. In W.G. Austin & S. Worchel (Eds.), *The Social Psychology of Intergroup Relations*, (pp. 33–37). Monterey, CA: Brooks/Cole.

Tedin, K.L. (1980). Assessing peer and parent influence on adolescent political attitudes. *American Journal of Political Science, 24*(1), 136-154.

The New York Times. (2017, August 9). *2016 Presidential Election Returns.* Retrieved from: https://www.nytimes.com/elections/2016/results/president.

UNESCO, U. (1977). The Tbilisi Declaration. In *Intergovernmental Conference on Environmental Education* (pp. 14–26).

U.S. Department of Agriculture (USDA) Food and Nutrition Service. 2020. Program data overview. https://www.fns.usda.gov/pd/overview. Updated 8/21/2020. Accessed December 29, 2020.

Van Poeck, K., Östman, L. (2018). Creating space for 'the political' in environmental and sustainability education practice: a Political Move Analysis of educators' actions. *Environmental Education Research, 24*(9), 1406-1423. http://dx.doi.org/10.1080/13504622.2017.1306835

Voting and Election Science Team, 2018, "2016 Precinct-Level Election Results", https://doi.org/10.7910/DVN/NH5S2I, Harvard Dataverse, V46.

Wildavsky, A., & Dake, K. (1990). Theories of risk perception: Who fears what and why? *Daedalus, 119*(4), 41-60.

Wittenberg, C. & Berinsky, A.J. (2020). Social media, echo chambers, and political polarization. Pp. 163-198. In *Social Media and Democracy: The State of the Field, Prospects for Reform*. Persily, N. and Tucker, J.A. (Eds.). Cambridge University Press.

Woehr, D. J., Loignon, A. C., Schmidt, P.B., Loughry, M. L., and Ohland, M. W. (2015). Justifying aggregation with consensus-based constructs: A review and examination or cutoff values for common aggregation indices. *Organizational Research Methods 18*(4), 704-737.

Wolak, J. (2009). Explaining change in party identification in adolescence. *Electoral Studies, 28*(4), 573-583. https://linkinghub.elsevier.com/retrieve/pii/S0261379409000523.

Chapter 3: Reflection

Political youth
Identity matters much
But not how you'd think

What I learned in graduate school… To get there, I think I have to start with how I ended up here in the first place. My pre-K-12 education was littered with field trips and environmental education experiences. Starting in pre-K, my dad and I were left behind at the Washington Zoo on a class trip. In fourth grade, I boarded the Living Classroom Foundation's Lady Maryland, a historic pungy schooner captained by an educator I would work with some 15 years later. In fifth through seventh grades, my school participated in a yearly 3-day residential EE program, one of which was at Echo Hill Outdoor School in Worton, Maryland. As part of my graduate research experience, I'd later meet a former Echo Hill educator some 3,000 miles across the country at an EE provider in Santa Ana, California. She knew my 7th grade educator, whose name I remember to this day. In high school, I donned my first pair of hip waders to test water quality at Rock Creek Park, just north of Washington, D.C.; I fell in love with wetlands while conducting salamander research at Jug Bay Wetlands Sanctuary; and I dipped my first kayak blade into the waters of the Patuxent River, all thanks to one incredibly dedicated and inspirational teacher. In undergrad, I was gifted with even more environmental role models – ones who valued field-based education and introduced me to some of the most magical and inspirational parts of the Chesapeake Bay. Whether by canoe or kayak, it was commonly said that you didn't get out of Salisbury University's Environmental Studies major without learning to paddle.

When I graduated from Salisbury, I thought education was the answer. If people only knew, if they only saw and experienced these places the way I have, they would change their behaviors. I set out with the intention of becoming an environmental educator so that I could introduce people

to the natural world in all the ways that I had been lucky enough to experience. If it worked for me, why shouldn't it work for others? But over time, I started to get the feeling that instilling knowledge wasn't enough – a suspicion further confirmed by my research in graduate school. And in my student leaders, I could see a desire for more than that. They each came to me with their own individual attitudes, dispositions, and worldviews. But collectively, they all shared a longing for the competence and confidence to create positive change in their communities and in the world. And it was my job – my passion – to help them discover that within themselves. I found myself revitalizing a haphazardly constructed program, guessing my way through logic models and theories of change. A lot of what we did seemed to work, but I couldn't always explain why. And more so, I couldn't explain why some aspects of our program worked for some students but not for others.

That brings me to what I've learned in graduate school - identity matters as much as anything. I wanted to go into the environmental field because I loved animals and plants and experiencing special places. Now, I find myself thinking more about people than about any of those. Students and educators arrive to programs with their own attitudes, beliefs, and worldviews. Tapping into these identities can make a program transformational, ignoring them can be detrimental – both to the students and to the success of the program. Since observing programs over the last month and a half, educator friends have asked me what my favorite programs have been. I have a hard time answering that question as so much of it seems to depend on the individual educator more than the program. I have seen the same program delivered by different educators and their individual identity has made all the difference. It's not so much what they teach – the content, the curriculum – or where they teach – knee-deep in a cypress swamp or surrounded by a nature center garden – but rather how they teach – their comfort, their passion, their ability to

connect to the lives of their students. Further, I have seen programs with significant cultural mismatches between educators and students; programs that I thought were perfectly adequate but were scored poorly by students, alluding to a lack of relevance or some sort of identity disconnect.

But identity isn't something easily changed, which brings me to my next graduate school takeaway – the importance of being a critically reflective practitioner in the field of EE. I've found myself asking, what is (*or could be*) the role of critical reflexivity in environmental education? For me, this means continually attending to the philosophical underpinnings of EE. How are we working toward the original mission the field set out to achieve? For example, in theory, the field of EE asserts a belief in the continual progress and improvement of society; however, in practice, it often falls victim to a celebration of individual behavior change, rather than structural systemic changes. Further, much of the field lacks an advocacy-orientation and tends to focus on achieving government-mandated science standards, rather than the field's social change imperatives. How could critical reflexivity help to move the field away from simply instilling knowledge and toward changing attitudes, dispositions, and behaviors. How could it help to make the field more equitable and just?

Being a critically reflective practitioner also means paying attention to my own praxis – the process and convergence of theory, practice, and reflection – as an educator, as a supervisor, and as a mentor. It means asking myself the hard questions and not shying away from even more difficult answers – How can we adapt and improve on the mission of EE to be sure we are meeting the needs of our current global society? Who should benefit from the efforts of EE? Which groups should we prioritize and why? How can we do our part to both meet the needs of our audience and address our most pressing environmental problems? How can I bolster feelings of autonomy, competence, and relatedness in my educators so that they can feel successful in leading their

programs? How can I bolster these feelings in students so that they can feel successful, environmentally literate, and civically engaged in life? These aren't easy questions to answer, but they are questions I feel more prepared to wrestle with thanks to my graduate experience.

Finally, the last lesson I want to acknowledge is that of adaptability and resilience – both in the field of EE and in myself. Just like environmental educators across the globe may have never expected to find themselves teaching in an online virtual environment, I never expected to find myself in graduate school in an online virtual environment. The hands-on, field-based experience is what most appealed to me about pursuing this degree, until everything changed in March 2020. While there were times in the last 2.5 years where I felt like an uprooted plant, taken from my lush, forested home, and placed in an office window with too much sun and not enough water, I ultimately adapted and proved to be more resilient than even I expected. Environmental educators tend to be some of the most adaptable people I know, and based on what I've seen, the field of EE is resilient too.

In my first committee meeting, Marc encouraged me to share what I wanted to do after my graduate experience. I still don't have one single answer to that. My answer remains: I want to always be learning and teaching; I want to work at the intersections of education, recreation, and social justice; I want to share my passions for place, for nature, and for creating with others; I want to work with rural and suburban communities to make them better places for plants, animals, and people; and I want to be a leader and an innovator in whatever it is I decide to do. That said, I do see a handful of possible career paths in my future – whichever I choose to pursue will likely depend a bit on luck and a lot on opportunity.

Some days I'd like to find myself in a director-level position at an environmental education organization – one where I can shape our connections with local communities, train and mentor

other environmental educators, evaluate and improve programs, and/or contribute to the systemic implementation of EE for all students.

Some days I envision turning my passion for native plant gardening into a career, using my social science background to convince homeowners to convert their monoculture lawns into native pollinator habitats.

Some days I think about pursuing a PhD and becoming a leading expert on EE in the Chesapeake Bay region. Or maybe in Appalachia. After all, I find that I feel most fulfilled doing work that is rooted in the places I love. I could evaluate the status of the environmental literacy goal put forth in the 1987 Chesapeake Bay Watershed Agreement. I could establish a network map of non-formal EE providers and their partnerships; create a comprehensive database of school districts, grades, numbers of students, etc. across multiple providers; describe the distribution of students reached across the watershed; depict the scaffolding of providers, programs, and content offered across various grade levels and programs; evaluate a random sample of providers in the region; conduct a random sample of area residents on their environmental attitudes, perceptions, and memories of EE field experiences; and make recommendations on the systemic implementation of EE in the region.

Some days I dream about continuing these travels across the U.S. – consulting on research, learning networks, program implementation, evaluation, or storytelling; part-time work, part-time van-life, full-time doing what I love.

Maybe that's what this whole grad school experience has really taught me.

Appendix

Table 1. Operationalization of sociopolitically relevant observed program variables

Educator Characteristics					
Educator identity *Not mutually exclusive. Could be more than one*	**Walking Encyclopedia** - focused on conveying a large amount of facts (sometimes which are irrelevant), often uses jargon, etc. **Authority Figure** - emphasizes own role as educator (a.k.a. boss) and focuses on rules and/or authority to communicate, may promote tension and opposition within the group, gets angry quickly, "focus on me when I talk", etc.				
Eloquence	Extent to which the educator spoke clearly and articulately and the flow of the communication was smooth.	1 Educator could not be clearly understood during most of the lesson. Pauses, confusion, or filler words like "like" or "um" over-ran the communication.	2 Educator was only mildly eloquent and had repeated issues with mumbling, fumbling, or unclear speech.	3 Educator communicated clearly. No major problems were noted.	4 Educator could be clearly heard throughout the entire program.
Pedagogical & Communicative Approaches					
Advocacy (our perspective)	Instructor/program was clearly favoring a specific viewpoint policy, or action as better than another (not as socially acceptable behavior) i.e. picking up trash, brushing teeth, recycling).	0 No	1 Yes		
Fact-focused (just the facts)	The extent to which the content that was conveyed was merely factual (devoid of deeper thought, consideration or emotions, values, or other non-factual considerations).	1 Content clearly included much more than facts	2 Some portions were merely factual, but strong efforts were made to go beyond just the facts	3 Most of the program was entirely factual, though a few efforts were made to go beyond just the facts	4 Virtually all content was entirely factual. No real efforts to trigger consideration or emotions, values, or other non-factual considerations
Group work	Degree to which the program requires/explicitly asks students to work with others.	1 No efforts made to incorporate group work	2 Minimal efforts to incorporate group work.	3 Moderate efforts to incorporate group work.	4 Major effort to incorporate group work.
Issue-based *(not just a mention of an issue – must actually focus on exploring, discussing and/or addressing it)*	Degree to which the lesson focuses on real-world environmental problems/issues, their consequences, and potential solutions.	1 No efforts made to incorporate issue-based learning into lesson	2 An issue is mentioned and/or explained, but students are not engaged in discussing solutions or thinking through the problem	3 An issue is defined and students discuss it and potential solutions	4 The program is focused on (and structured around) an issue or issues, Students discuss and/or investigate potential solutions
Play-based learning		1	2	3	4

	Degree to which the lesson actively engages students in games or competition as an intentional teaching technique.	No efforts made to incorporate play-based learning	Minimal efforts to incorporate play-based learning– possibly a short game.	Moderate efforts to incorporate play-based learning. A game(s) made up a meaningful portion of the program.	Most of the program was play-based.
Scientist role play	Educator used something like the phrase "Today, we're going to be scientists."	1 = Yes	0 = No		
Verbal engagement	Degree to which the educator asked questions or engaged students in dialogue.	1 Not at all	2 Minimal efforts (asked a few simple questions here and there)	3 Moderate efforts (frequent questioning)	4 Major efforts (primary way in which the educator communicated)

Demographic variables

There were expected relationships between sociopolitical context and socioeconomic status, race, and urbanity[5]. As such, we examined whether controlling for grade or race would confound any of the other demographic variables. One concern was that the majority Black category, which is limited to only Democratic contexts, would be associated with lower socioeconomic status as well. We found that there was no difference between majority Black groups and non-majority Black groups with regard to socioeconomic status (% FRPL) so therefore, we were able to proceed with our analyses.

Table 2. One-way ANOVA comparing the proportion of free and reduced-price lunch eligibility (% FRPL) between schools of different sociopolitical contexts. Different superscripts indicate statistically significant difference between groups (p < 0.001).

	Sociopolitical context (n)					
	Democratic	**Mixed**	**Republican**	**Test statistic**	**p**	**η^2**
10-point landslide	**(104)**	**(48)**	**(79)**			
% FRPL	65.68[a]	55.2[b]	48.59[b]	Welch: 12.24	< 0.001	0.098
20-point landslide	**(91)**	**(82)**	**(58)**			
% FRPL	66.12[a]	53.98[b]	49.59[b]	Welch: 10.66	< 0.001	0.083

Eta-squared effect size: .01 = small effect, 0.06 = medium effect, & 0.14 = large effect

[5] *Urbanity* is a categorical variable based on NCES's urban-centric school locale categories released in 2006 in partnership with the Census Bureau (Provasnik et al., 2007).

Table 3. Chi-square tests examining relationships between potentially confounding demographic variables (grade, race, urbanity) and sociopolitical context using the 10-point landslide.

	Frequencies					
	Democrat-leaning	**Mixed**	**Republican-leaning**	**Pearson chi-square**	**p**	**Cramer's V**
Grade 5	39	29	36	8.04	0.018	0.19
Grade 6	34	10	32	5.35	0.069	0.15
Grade 7	28	8	8	7.65	0.022	0.18
Grade 8	7	1	3	1.65	0.438	0.08
Majority White*	24	16	67	75.69	< 0.001	0.57
Majority Latinx*	51	20	12	21.56	< 0.001	0.30
Majority Black*	17	0	0	21.55	< 0.001	0.30
No racial majority*	16	12	0	19.38	< 0.001	0.29
Urban*	38	11	0	33.92	< 0.001	0.38
Suburban	54	34	37	8.98	0.011	0.20
Town/Rural*	15	1	40	50.32	< 0.001	0.47

Grade and race (*df* = 3): Cramer's V $\geq$ 0.06 = small effect, $\geq$ 0.17 = medium effect, & $\geq$ 0.29 = large effect.
Urbanity (*df* = 2): Cramer's V $\geq$ 0.07 = small effect, $\geq$ 0.21 = medium effect, & $\geq$ 0.35 = large effect.

Table 4. Chi-square tests examining relationships between potentially confounding demographic variables (grade, race, urbanity) and sociopolitical context using the 20-point landslide.

	Frequencies					
	Strongly Democratic	**Mixed**	**Strongly Republican**	**Pearson chi-square**	**p**	**Cramer's V**
Grade 5	34	43	27	5.11	0.078	0.15
Grade 6	27	24	25	4.09	0.129	0.13
Grade 7	27	13	4	11.65	0.003	0.22
Grade 8	7	2	2	2.66	0.265	0.11
Majority White	21	33	53	71.11	< 0.001	0.55
Majority Latinx	43	35	5	24.16	< 0.001	0.32
Majority Black	17	0	0	27.01	< 0.001	0.34
No racial majority	14	14	0	10.65	0.005	0.21
Urban	33	16	0	25.92	< 0.001	0.34
Suburban	47	51	27	4.42	0.110	0.14
Town/Rural	14	13	29	30.30	< 0.001	0.36

Grade and race (*df* = 3): Cramer's V of 0.06 = small effect, 0.17 = medium effect, & 0.29 = large effect.
Urbanity (*df* = 2): Cramer's V of 0.07 = small effect, 0.21 = medium effect, & 0.35 = large effect.

Table 5. Observed frequencies of programmatic characteristics by sociopolitical context using the 10-point landslide.

		Frequencies %, (n)			
	Total	**(1)**	**(2)**	**(3)**	**(4)**
Eloquence	235		6.8% (16)	87.2% (205)	6.0% (14)
Democrat-leaning	*46% (108)*		*7.4% (8)*	*87% (94)*	*5.6% (6)*
Mixed	*20.4% (48)*		*2.1% (1)*	*91.7% (44)*	*6.3% (3)*
Republican-leaning	*33.6% (79)*		*8.9% (7)*	*84.8% (67)*	*6.3% (5)*
Play-based	235	72.3% (170)	21.7% (51)	3.4% (8)	2.6% (6)
Democrat-leaning	*46% (108)*	*66.7% (72)*	*27.8% (30)*	*4.6% (5)*	*0.9% (1)*
Mixed	*20.4% (48)*	*89.6% (43)*	*8.3% (4)*	*2.1% (1)*	
Republican-leaning	*33.6% (79)*	*69.6% (55)*	*21.5% (17)*	*2.5% (2)*	*6.3% (5)*
Fact-focused	235	3.0% (7)	17.4% (41)	59.6% (140)	20% (47)
Democrat-leaning	*46% (108)*	*1.9% (2)*	*16.7% (18)*	*65.7% (71)*	*15.7% (17)*
Mixed	*20.4% (48)*		*33.3% (16)*	*50.0% (24)*	*16.7% (8)*
Republican-leaning	*33.6% (79)*	*6.3% (5)*	*8.9% (7)*	*57.0% (45)*	*27.8% (22)*
Issue-based	235	30.2% (71)	57.9% (136)	10.6% (25)	1.3% (3)
Democrat-leaning	*46% (108)*	*19.4% (21)*	*66.7% (72)*	*11.1% (12)*	*2.8% (3)*
Mixed	*20.4% (48)*	*35.4% (17)*	*50.0% (24)*	*14.6% (7)*	
Republican-leaning	*33.6% (79)*	*41.8% (33)*	*50.6% (40)*	*7.6% (6)*	
Verbal engagement	235	0.9% (2)	36.2% (85)	60.4% (142)	2.6% (6)
Democrat-leaning	*46% (108)*		*34.3% (37)*	*64.8% (70)*	*0.9% (1)*
Mixed	*20.4% (48)*		*35.4% (17)*	*58.3% (28)*	*6.3% (3)*
Republican-leaning	*33.6% (79)*	*2.5% (2)*	*39.2% (31)*	*55.7% (44)*	*2.5% (2)*
Group work	235	32.3% (76)	40.4% (95)	19.6% (46)	7.7% (18)
Democrat-leaning	*46% (108)*	*35.2% (38)*	*49.1% (53)*	*12.0% (13)*	*3.7% (4)*
Mixed	*20.4% (48)*	*25.0% (12)*	*35.4% (17)*	*31.3% (15)*	*8.3% (4)*
Republican-leaning	*33.6% (79)*	*32.9% (26)*	*31.6% (25)*	*22.8% (18)*	*12.7% (10)*
	Total	**(0)**	**(1)**		
Advocacy	235	72.3% (170)	27.7% (65)		
Democrat-leaning	*46% (108)*	*71.3% (77)*	*28.7% (31)*		
Mixed	*20.4% (48)*	*75% (36)*	*25% (12)*		
Republican-leaning	*33.6% (79)*	*72.2% (57)*	*27.8% (22)*		
Scientist role play	235	66.0% (155)	34.0% (88)		
Democrat-leaning	*46% (108)*	*65.7% (71)*	*34.3% (37)*		
Mixed	*20.4% (48)*	*60.4% (29)*	*39.6% (19)*		
Republican-leaning	*33.6% (79)*	*69.6% (55)*	*30.4% (24)*		
ID: Walking encyclopedia	235	72.8% (171)	27.2% (64)		
Democrat-leaning	*46% (108)*	*68.5% (74)*	*31.5% (34)*		
Mixed	*20.4% (48)*	*75.0% (36)*	*25.0% (12)*		
Republican-leaning	*33.6% (79)*	*77.2% (61)*	*22.8% (18)*		
ID: Authority figure	235	73.6% (173)	26.4% (62)		
Democrat-leaning	*46% (108)*	*77.8% (84)*	*22.2% (24)*		
Mixed	*20.4% (48)*	*75.0% (36)*	*25.0% (12)*		
Republican-leaning	*33.6% (79)*	*67.1% (53)*	*32.9% (26)*		

Table 6. Observed frequencies of programmatic characteristics by sociopolitical context using the 20-point landslide.

		Frequencies %, (n)			
	Total	**(1)**	**(2)**	**(3)**	**(4)**
Eloquence	235		6.8% (16)	87.2% (205)	6% (14)
Strongly Democratic	*40.4% (95)*		*7.4% (7)*	*88.4% (84)*	*4.2% (4)*
Mixed	*34.9% (82)*		*6.1% (5)*	*82.9% (68)*	*11% (9)*
Strongly Republican	*24.7% (58)*		*6.9% (4)*	*91.4% (53)*	*1.7% (1)*
Play-based	235	72.3% (170)	21.7% (51)	3.4% (8)	2.6% (6)
Strongly Democratic	*40.4% (95)*	*63.2% (60)*	*30.5% (29)*	*5.3% (5)*	*1.1% (1)*
Mixed	*34.9% (82)*	*87.8% (72)*	*11% (9)*	*1.2% (1)*	
Strongly Republican	*24.7% (58)*	*65.5% (38)*	*22.4% (13)*	*3.4% (2)*	*8.6% (5)*
Fact-focused	235	3% (7)	17.4% (41)	59.6% (140)	20% (47)
Strongly Democratic	*40.4% (95)*		*15.8% (15)*	*68.4% (65)*	*15.8% (15)*
Mixed	*34.9% (82)*	*8.5% (7)*	*25.6% (21)*	*45.1% (37)*	*20.7% (17)*
Strongly Republican	*24.7% (58)*		*8.6% (5)*	*65.5% (38)*	*25.9% (15)*
Issue-based	235	30.2% (71)	57.9% (136)	10.6% (25)	1.3% (3)
Strongly Democratic	*40.4% (95)*	*21.1% (20)*	*67.4% (64)*	*9.5% (9)*	*2.1% (2)*
Mixed	*34.9% (82)*	*35.4% (29)*	*50% (41)*	*13.4% (11)*	*1.2% (1)*
Strongly Republican	*24.7% (58)*	*37.9% (22)*	*53.4% (31)*	*8.6% (5)*	
Verbal engagement	235	0.9% (2)	36.2% (85)	60.4% (142)	2.6% (6)
Strongly Democratic	*40.4% (95)*		*34.7% (33)*	*64.2% (61)*	*1.1% (1)*
Mixed	*34.9% (82)*		*42.7% (35)*	*53.7% (44)*	*3.7% (3)*
Strongly Republican	*24.7% (58)*	*3.4% (2)*	*29.3% (17)*	*63.8% (37)*	*3.4% (2)*
Group work	235	32.3% (76)	40.4% (95)	19.6% (46)	7.7% (18)
Strongly Democratic	*40.4% (95)*	*33.7% (32)*	*51.6% (49)*	*10.5% (10)*	*4.2% (4)*
Mixed	*34.9% (82)*	*34.1% (28)*	*35.4% (29)*	*25.6% (21)*	*4.9% (4)*
Strongly Republican	*24.7% (58)*	*27.6% (16)*	*29.3% (17)*	*25.9% (15)*	*17.2% (10)*
	Total	**(0)**	**(1)**	**(2)**	
Advocacy	235	72.3% (170)	27.7% (65)		
Strongly Democratic	*40.4% (95)*	*69.5% (66)*	*30.5% (29)*		
Mixed	*34.9% (82)*	*76.8% (63)*	*23.2% (19)*		
Strongly Republican	*24.7% (58)*	*70.7% (41)*	*29.3% (17)*		
Scientist role play	235	66% (155)	34% (80)		
Strongly Democratic	*40.4% (95)*	*69.5% (66)*	*30.5% (29)*		
Mixed	*34.9% (82)*	*59.8% (49)*	*40.2% (33)*		
Strongly Republican	*24.7% (58)*	*69% (40)*	*31% (18)*		
ID: Walking encyclopedia	235	72.8% (171)	27.2% (64)		
Strongly Democratic	*40.4% (95)*	*68.4% (65)*	*31.6% (30)*		
Mixed	*34.9% (82)*	*72% (59)*	*28% (23)*		
Strongly Republican	*24.7% (58)*	*81% (47)*	*19% (11)*		
ID: Authority figure	235	73.6% (173)	26.4% (62)		
Strongly Democratic	*40.4% (95)*	*77.9% (74)*	*22.1% (21)*		
Mixed	*34.9% (82)*	*76.8% (63)*	*23.2% (19)*		
Strongly Republican	*24.7% (58)*	*62.1% (36)*	*37.9% (22)*		

Tables 7. Two-way ANOVA SPSS outputs of student EE21 outcomes as a function of programmatic characteristic and sociopolitical context, controlling for grade and race.

Eloquence

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.871[a]	5	1.174	2.010	.079	.053
Intercept	.643	1	.643	1.101	.295	.006
Landslide10_RepAvg	.259	1	.259	.444	.506	.002
N_eloquence	.924	2	.462	.791	.455	.009
Landslide10_RepAvg * N_eloquence	4.257	2	2.129	3.645	.028	.039
Error	105.708	181	.584			
Total	111.605	187				
Corrected Total	111.578	186				

a. R Squared = .053 (Adjusted R Squared = .026)

Group work

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4.490[a]	5	.898	1.596	.162	.034
Intercept	.002	1	.002	.003	.958	.000
Landslide10_RepAvg	2.417	2	1.208	2.148	.119	.018
Bi_group	.031	1	.031	.054	.816	.000
Landslide10_RepAvg * Bi_group	3.473	2	1.736	3.086	.048	.026
Error	128.852	229	.563			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .034 (Adjusted R Squared = .013)

Issue-based

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.281[a]	5	1.056	1.892	.097	.040
Intercept	.160	1	.160	.286	.593	.001
Landslide10_RepAvg	3.640	2	1.820	3.260	.040	.028
Bi_issue	.011	1	.011	.019	.891	.000
Landslide10_RepAvg * Bi_issue	4.115	2	2.057	3.685	.027	.031
Error	127.284	228	.558			
Total	132.568	234				
Corrected Total	132.565	233				

a. R Squared = .040 (Adjusted R Squared = .019)

Play-based

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	10.032[a]	5	2.006	3.726	.003	.075
Intercept	.006	1	.006	.010	.919	.000
Landslide10_RepAvg	.393	2	.196	.365	.695	.003
Bi_play	.574	1	.574	1.067	.303	.005
Landslide10_RepAvg * Bi_play	7.730	2	3.865	7.177	<.001	.059
Error	123.310	229	.538			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .075 (Adjusted R Squared = .055)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	16.036[a]	5	3.207	6.261	<.001	.120
Intercept	.746	1	.746	1.455	.229	.006
Bi_play	4.702	1	4.702	9.179	.003	.039
Landslide20_RepAvg	2.809	2	1.404	2.742	.067	.023
Bi_play * Landslide20_RepAvg	10.114	2	5.057	9.872	<.001	.079
Error	117.307	229	.512			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .120 (Adjusted R Squared = .101)

Fact-focused

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	19.797[a]	8	2.475	4.926	<.001	.148
Intercept	.326	1	.326	.649	.421	.003
N_fact	3.875	2	1.937	3.856	.023	.033
Landslide10_RepAvg	.897	2	.448	.892	.411	.008
N_fact * Landslide10_RepAvg	10.979	4	2.745	5.463	<.001	.088
Error	113.545	226	.502			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .148 (Adjusted R Squared = .118)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	14.202[a]	8	1.775	3.367	.001	.107
Intercept	.149	1	.149	.283	.595	.001
Landslide20_RepAvg	1.373	2	.686	1.302	.274	.011
N_fact	7.975	2	3.988	7.564	<.001	.063
Landslide20_RepAvg * N_fact	1.884	4	.471	.894	.468	.016
Error	119.141	226	.527			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .107 (Adjusted R Squared = .075)

Educator ID: Authority figure

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	8.413[a]	5	1.683	3.084	.010	.063
Intercept	.381	1	.381	.698	.404	.003
Landslide10_RepAvg	3.138	2	1.569	2.876	.058	.025
ID_Auth	1.689	1	1.689	3.096	.080	.013
Landslide10_RepAvg * ID_Auth	6.685	2	3.343	6.127	.003	.051
Error	124.930	229	.546			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .063 (Adjusted R Squared = .043)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7.328[a]	5	1.466	2.663	.023	.055
Intercept	.079	1	.079	.143	.706	.001
ID_Auth	1.038	1	1.038	1.886	.171	.008
Landslide20_RepAvg	5.924	2	2.962	5.383	.005	.045
ID_Auth * Landslide20_RepAvg	2.147	2	1.074	1.951	.144	.017
Error	126.014	229	.550			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .055 (Adjusted R Squared = .034)

Educator ID: Walking encyclopedia

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.780[a]	5	1.156	2.075	.069	.043
Intercept	.721	1	.721	1.294	.256	.006
Landslide10_RepAvg	.155	2	.077	.139	.870	.001
ID_Encyc	4.327	1	4.327	7.768	.006	.033
Landslide10_RepAvg * ID_Encyc	.609	2	.305	.547	.580	.005
Error	127.562	229	.557			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .043 (Adjusted R Squared = .022)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9.535[a]	5	1.907	3.527	.004	.072
Intercept	.634	1	.634	1.174	.280	.005
Landslide20_RepAvg	1.057	2	.528	.977	.378	.008
ID_Encyc	4.629	1	4.629	8.562	.004	.036
Landslide20_RepAvg * ID_Encyc	1.825	2	.913	1.688	.187	.015
Error	123.807	229	.541			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .072 (Adjusted R Squared = .051)

Verbal engagement

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6.555[a]	5	1.311	2.368	.040	.049
Intercept	.040	1	.040	.072	.789	.000
Bi_verbal	3.415	1	3.415	6.168	.014	.026
Landslide10_RepAvg	.776	2	.388	.701	.497	.006
Bi_verbal * Landslide10_RepAvg	1.537	2	.768	1.388	.252	.012
Error	126.787	229	.554			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .049 (Adjusted R Squared = .028)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9.557[a]	5	1.911	3.536	.004	.072
Intercept	.061	1	.061	.113	.737	.000
Bi_verbal	4.572	1	4.572	8.458	.004	.036
Landslide20_RepAvg	1.858	2	.929	1.718	.182	.015
Bi_verbal * Landslide20_RepAvg	2.029	2	1.015	1.877	.155	.016
Error	123.786	229	.541			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .072 (Adjusted R Squared = .051)

Advocacy

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1.642[a]	5	.328	.571	.722	.012
Intercept	.000	1	.000	.000	.987	.000
Landslide10_RepAvg	.651	2	.326	.566	.569	.005
Bi_advocacy	.160	1	.160	.278	.598	.001
Landslide10_RepAvg * Bi_advocacy	.372	2	.186	.323	.724	.003
Error	131.700	229	.575			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .012 (Adjusted R Squared = -.009)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5.724[a]	5	1.145	2.054	.072	.043
Intercept	.005	1	.005	.009	.923	.000
Bi_advocacy	.525	1	.525	.942	.333	.004
Landslide20_RepAvg	1.859	2	.929	1.668	.191	.014
Bi_advocacy * Landslide20_RepAvg	1.364	2	.682	1.224	.296	.011
Error	127.618	229	.557			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .043 (Adjusted R Squared = .022)

Scientist role play

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2.816[a]	5	.563	.988	.426	.021
Intercept	.273	1	.273	.479	.490	.002
Landslide10_RepAvg	.893	2	.447	.784	.458	.007
Scientists	.771	1	.771	1.353	.246	.006
Landslide10_RepAvg * Scientists	.553	2	.277	.485	.616	.004
Error	130.526	229	.570			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .021 (Adjusted R Squared = .000)

Tests of Between-Subjects Effects

Dependent Variable: grade_race_GMC_EE21_revised_ETsample

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	6.031[a]	5	1.206	2.170	.058	.045
Intercept	.411	1	.411	.740	.391	.003
Scientists	1.055	1	1.055	1.898	.170	.008
Landslide20_RepAvg	3.136	2	1.568	2.820	.062	.024
Scientists * Landslide20_RepAvg	.636	2	.318	.572	.565	.005
Error	127.312	229	.556			
Total	133.343	235				
Corrected Total	133.343	234				

a. R Squared = .045 (Adjusted R Squared = .024)