Awakening, Efficacy, and Action:

A Qualitative Inquiry of a Social Justice-Infused, Science Education Program

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Date Submitted: July 14, 2016

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Abstract

This article describes an innovative application of a social justice-infused pedagogy to an out-of-school program for urban high school students. Using an interdisciplinary framework, the program featured a coherent synthesis of Science, Technology, Engineering, and Math (STEM) education, highlighting environmental and food justice perspectives; social justice education; and career and college planning. We used qualitative content analysis to analyze two separate interviews with six female and three male students of color ranging in age from 15 to 18 with an average age of 16.1 (*SD* = 1.26) across an approximately 10-month time span. Utilizing a model of critical consciousness

development as our organizing framework, we explored the students' understanding of environmental and food justice issues. Participants indicated that they were actively engaged in learning about food and environmental justice, exploring STEM careers, and investigating the various ways that social justice is manifested in their lives. Implications for social justice and STEM education interventions as well as broader public policies are discussed.

Key Words: STEM education, social justice education, STEM career development, critical consciousness

One of the major challenges that face high school students is preparing for meaningful and decent work in an economic landscape that is increasingly competitive and unstable (Blustein, 2013; Flores, 2013). A key to opportunity for many students is the acquisition of skills in Science, Technology, Engineering, and Math (STEM), which can help to expand career opportunities, often dramatically (Shoffner & Dockery, 2015; U.S. Congress Joint Economic Committee, 2012). Despite the calls for greater attainment of STEM skills, students of color and students from poor and working class backgrounds continue to struggle in gaining a foothold in the STEM world (U.S. Congress Joint Economic Committee; U.S. Census Bureau, 2013).

Students who are not able to nurture their STEM interests and develop STEM skills may face greater challenges in accessing economic opportunities for much of their adult lives (U.S. Congress Joint Economic Committee, 2012). The capacity of the U.S. to produce the next wave of technological innovations is also compromised by the fact that the educational system is not producing and retaining a sufficient number of STEM-related workers, researchers, and technicians (Business Higher Education Forum, 2005; Maltese & Tai, 2011; Schmidt, Hardinge, & Rokutani, 2012). Furthermore, the lack of STEM workers, particularly from communities of color and historically marginalized communities, may reduce the capacity of these communities to foster economic growth and job

creation, exacerbating socioeconomic and racial/ethnic disparities (Akom, Scott, & Shah, 2013; U.S. Congress Joint Economic Committee). To address these needs, educators and psychologists have developed programs that seek to attract the interests of marginalized students to the STEM world and enhance their STEM-related skills. The programs have varied from new curricula infused in existing STEM classes to out-of-school programs that often have a broader and more inclusive focus (e.g., Barton & Tan, 2010a; Blustein et al., 2013; Shoffner & Dockery, 2015).

In addition to fostering greater openness in the STEM pipeline, substantive changes are needed to make STEM workplaces more welcoming for people of color and women who are often profoundly marginalized from upwardly mobile career pathways (see Singh et al., 2013 for an exemplar of the problems in the STEM workplace). This article is focused on an in-depth description and exploration of a unique blend of social justice pedagogy, STEM education, and career and college planning in the development of an out-of-school program for urban high school students. By social justice, we refer to initiatives directed toward reducing the unfair distribution of resources and opportunity that leads to disproportionate vulnerability for historically underserved populations (Young, 1990). Given the underrepresentation of women and minority-status individuals in STEM fields, the combination of social justice pedagogy with STEM education and college/career planning is promisingly synergistic.

Building on the growing interest in integrating STEM education with social justice education, we discuss a program (known in this article as University Bound—UB), which confronts the challenges of enhancing opportunities for students who continue to be left out of an important ticket to success—a rigorous and relevant education in STEM knowledge, career planning skills, and social justice awareness. Our view is that the recipients of STEM educational initiatives need to join in the conversation about the "elephants in the room"—the social justice issues that are inherent in STEM

education and in the entire process of gaining a foothold in the contemporary labor market (Akom et al., 2013; Blustein et al., 2013).

A number of important sources of knowledge that have the potential to advance STEM education, career development, and social justice education can be generated from this project. First, we present a program that is derived from an application of an integrative theoretical perspective encompassing STEM education (e.g., Barab, Hay, Barnett, & Keating, 2000; Barton & Tan, 2010a) in the areas of urban ecology and indoor farming, career development (Blustein, 2006, 2013), and social justice education (Freire, 2007). The material presented herein provides a roadmap for educators and activists who seek to design relevant and rigorous programs for students who have been historically marginalized in their educational and career pursuits. Next, we describe the role of critical consciousness (CC) as an educational and psychological tool, examining its potential role as an "antidote" to oppression in the context of STEM out of school education (Watts, Griffith, & Abdul-Adil, 1999). Finally, by exploring how this integrative perspective is perceived by students at two different points in time, we have access to a valuable body of qualitative data that can help to map how social justice-based STEM education may serve as the transformative engine of change.

Theoretical Frameworks

The theoretical frameworks for this project include perspectives from participatory learning, vocational psychology, and critical analyses of educational affordances and opportunities. The UB's STEM curriculum has been informed by the theory of participatory learning environments, which refers to a pedagogy that engages students in collaborative, participatory science learning activities (Barab et al., 2000). The objective of participatory learning is to work toward addressing a real-world need that students have identified as important to themselves and to society (Resnick, 1987; Savery & Duffy, 1996).

The college and career planning aspects of the curriculum were developed based on an application of the psychology-of-working framework (PWF; Blustein, 2006, 2013). The PWF represents a social-justice informed perspective on work and careers that highlights assumptions that are relevant to the college and career planning aspects of the UB program (Blustein, 2006, 2013). While a thorough overview of the PWF is beyond the scope of this article, the pertinent aspects of this perspective that have informed the UB program include: 1) the focus on enhancing educational and work-based volition as much as possible; 2) nurturing inherent strivings for a life of meaning and self-determination at work; and 3) enriching students' capacities to develop and sustain relational connections that will provide both emotional and instrumental support in negotiating work-based transitions (See Blustein, 2006, 2013 for reviews of the PWF.)

The social justice education aspect of UB, and the entire UB program, was informed by critical consciousness (CC) theory and practice. Freire's (2007) approach to fostering literacy among oppressed people in Brazil emphasized learning to "read the world, and to read the word." In this dialogical process, oppressed people develop CC by learning to read the sociopolitical conditions that maintain or perpetuate injustice and develop the capacity to act to change their world. When oppressed people developed the capacity to more critically "read the world," or carefully analyze their social conditions, their capacity for agency increased. Freire argued that this CC – which encompasses critical social analysis of inequality and taking action to reduce inequality – unlocks human agency, such as the capacity to "read the word," as the development of CC leads people to become less constrained by societal inequities.

Watts, Diemer, and Voight (2011) identified three components of CC: critical reflection, political efficacy, and critical action. Through critical reflection, individuals analyze, question, and reject societal inequities that affect their well-being and agency. Political efficacy relates to people's perceptions of their capacities to make sociopolitical change by engaging in action. Lastly, critical

action reflects either individual and/or collective action that aims to change the unequal structures of society. These components are likely to interact with each other in complex ways, so critical reflection may affect critical action, and vice versa (Watts et al., 2011). Watts and colleagues (1999) describe CC as an important psychological tool that can be used to help urban youth cope with and overcome sociopolitical barriers. That is, if adolescents become more aware of the sociopolitical barriers they face, the perceived capacity to effect change, and engage in action, then they are more likely to develop the skills and confidence to navigate these oppressive systems and develop an increased sense of agency to engage in developmentally vital academic and career tasks (Diemer & Blustein, 2006). Diemer, Kauffman, Koenig, Trahan, and Hsieh (2006) noted that providing support for urban students to challenge racism, sexism, and other forms of social injustice is linked to the reflection component of CC.

As part of UB's social justice curriculum, students were given a voice in deciding how to best construct a vital space from which they could challenge the injustices they see in their communities and in the media. In line with Freire's (2007) perspective and contemporary interventions to foster CC (Watts & Hipolito-Delgado, 2015), students were provided with prompts to spur discussion, but had the final say on the themes that shaped class projects based on issues that were most salient to them. Although UB social justice class projects differed by grade level, all of them were forms of youth participatory action research (YPAR; Cammarota & Fine, 2008), in that students identified problems in their communities and then conducted research on how to address them with the ultimate goal of sharing findings with community members and policy makers. Students participated in a collaborative process with the UB instructors through the projects they developed to improve the systemic conditions that affect their communities. For example, 11th graders participated in a Photovoice project (Wang, 2006) and constructed narratives using pictures from their neighborhoods and communities to highlight sources of injustice. By having the students not only engage in critical

reflection, but also organize and plan outreach initiatives designed to inform policy makers and the public, UB's social justice curriculum has endeavored to enhance all three components of CC. In addition, the curriculum aimed to build political efficacy and to turn that efficacy into action. Because action is given less attention than reflection in many CC interventions (Watts & Hipolito-Delgago, 2015), the emphasis on action in the UB program is a unique asset.

In a related vein, some innovative conceptual and theoretical efforts have been made to infuse an explicit social justice perspective in STEM education with encouraging results. Akom et al. (2013) articulated a compelling rationale for STEM education serving as a vehicle for social change and transformation in the lives of African American working class youth. Using a conceptual framework known as structural resistance and agency (SRA), which has a number of parallels to the critical consciousness framework used in this project, Akom et al. described STEM-based programs in high school that have sought to enhance students' critical thinking as well as their knowledge of STEM-related content material. Another relevant line of inquiry is the work on goal incongruity by Diekman, Weisgram, and Belanger (2015), which has argued that one of the reasons that women do not pursue STEM careers is that they perceive this field as being incongruous with their strivings to help others and their communities. The use of a social justice curriculum, weaved throughout an out-of-school program, may provide students an illustration of how to construct a STEM career that is linked to altruism.

Environmental and Food Justice: Core Aspects of the STEM Curriculum

The STEM curriculum incorporated the CC focus of the program by considering the relationship between social and ecological systems and reflecting on how dominant cultural and sociopolitical factors affect people's environment and health (Akom, 2011; Barton & Tan, 2010a, 2010b; Furman & Gruenewald, 2004). Specifically, UB grounded the STEM curriculum in the topics

of environmental and food justice. The U.S. Environmental Protection Agency (2013) describes *environmental justice* as the fair treatment of all people with regard to the development, implementation and enforcement of environmental laws, regulations and policies. Although this definition of environmental justice emphasizes that everyone would be protected from environmental and health hazards equally, a number of public health studies (e.g., Brulle & Pellow, 2006) provide striking findings with reference to the ways that residential segregation and environmental pollution contribute to environmental inequality, poverty, and health disparities in the U.S.

Another key aspect of the STEM education curriculum is *food justice*, which concerns the equal share of the benefits and risks of how food is grown, processed, transported, distributed, and consumed (Gottlieb & Joshi, 2010). As Alkon and Agyeman (2011) posit, "food is not only linked to ecological sustainability, community, and health, but also to racial, economic, and environmental justice" (p. 4). People from impoverished backgrounds often lack access to affordable, healthy, and locally available food, and therefore, live in what are referred to as food deserts (Walker, Keane, & Burke, 2010). By informing students about these endemic sources of inequity, we sought to enhance the relevance of the STEM material while fostering growth in CC (both critical reflection on the racial and socioeconomic dimensions to food deserts and the critical action to address these inequities).

Present Study

The theoretical approaches towards social justice pedagogy, STEM education, and college and career planning were integrated in the UB program and curriculum in multiple ways. We envision progress in career development as a means of enacting CC at an "individual" level. As Blustein (2006) noted, a core need fulfilled by work is survival and power. From an individual perspective, one useful way of dealing with oppressive forces might be to attain the highest level of agency and achievement possible, thereby reducing the impact of aversive social forces and providing

transformative opportunities to fight oppression. Within the UB program, we presented STEM careers as a means of enhancing one's social and economic power and attaining a career that yields access to the world of innovation and technology. Reflecting a critical pedagogy of transformation, these are not seen as ends unto themselves—lest individuals merely gain power and privilege over others thereby perpetuating existing systems of inequity—but rather, as tools to be used to critique and change the fundamental assumptions and priorities of an unfair and inequitable socioeconomic system.

In this study, we explored how UB students understood the linkage among various elements of the UB program, with a particular focus on their experience of the justice-oriented aspects of the STEM and social justice curriculum. We also intended to understand how the students' perceptions of the program relate to their educational and career-related plans (Chronister & McWhirter, 2006; Diemer, 2009).

Method

Program Structure

The UB program was comprised of six-hour sessions on a college campus in the northeastern region of the U.S. approximately every other Saturday during the school year, as well as three-day programs over school vacations in the winter and spring, and two full weeks during the summer. Approximately sixty 9th-12th grade students from several public high schools in a large urban district enrolled in the UB program each year. Students typically joined the program in the fall or summer at the outset of their 9th grade year, and remained through the summer after 12th grade. Program participants are relatively consistent in their attendance, with an average attendance rate of two-thirds of the sessions each semester. The vast majority of students were youth of color who are underrepresented in STEM fields. During the initial year of the data collection for this study, 63% of

the students identified as African American and 28% identified as Latino. (There is some overlap among the students who selected African American and Latino as some students checked both options.)

Program participants were recruited through recommendations by UB school liaisons, teachers familiar with the program, current students, alumni, and outreach by UB staff. Recruitment targeted students whom teachers or other staff members believed could benefit from the additional support provided by the program due to their average academic performance, and inconsistent motivation and school engagement. This recruitment strategy reduces the threat of potential selection bias (i.e., only the "cream of the crop" or more agentic students self-selected into the UB program). Furthermore, this recruitment approach yielded a more representative sample of the student population and also suggests how the UB program may be feasible among students who are not already on a trajectory toward STEM success.

The UB program focused on community-based STEM-related issues that were closely related to students' social and physical environments as well as health. UB used advanced technology tools, such as Geographic Information Systems (GIS), site visits, and interviews with the members of students' communities to identify the needs and interests of those communities. While investigating social justice issues in their neighborhoods, students created complex maps of their access to food and found that their neighborhoods do not have equal access to healthy food compared to other areas of the city.

In response to the awareness of local food deserts raised by students' work, the program turned to innovative STEM-based solutions to engage students in potential action around the food justice challenge. Students learned to produce healthy food using novel tools such as hydroponics and green energy technologies. Hydroponics refers to the process of growing plants using water filled

with nutrients that replicate some of the attributes of soil. An advantage of hydroponics was that students could grow their own food indoors and share it with their families, while also learning important principles about physics, chemistry, biology, food justice, and community well-being. This practical approach can enhance political efficacy and increase the likelihood that students will engage in critical action.

Participants

We selected a purposive sample of nine students for in-depth interviews. This sample was intended to represent the ethnic and racial diversity present in the overall program population. In addition, attendance records indicated that these students had been attending the UB sessions regularly for at least six months, suggesting a reasonable level of engagement and "dosage." We were limited to a small sample due to time restrictions, a desire to interview all participants at the same points in the curriculum, and our two time-point data collection strategy, which we hoped would enrich the information provided by the participants as they became more immersed in the curriculum. Our intention with the purposive sampling was to obtain input from students who could describe their experiences in a detailed fashion, thereby helping to examine the subtle and more overt aspects of this unique STEM-based psychoeducational program. The sample for the present study consisted of six female and three male high school students, ranging in ages from 15 to 18 with an average age of 16.1 (*SD* = 1.26). Similar to the overall UB population, the students were from diverse ethnic and racial backgrounds, including one multiracial student, five African-American students, and three Latina students (see Table 1 for participant demographics). All of the students came from low-income and/or working-class backgrounds and attended public schools with limited financial and educational resources.

Participants were interviewed at two points during their participation in the UB program, with approximately 10 months, on average, separating these interviews. Most of the students were interviewed in the spring of their first year in the program, although three of the students had enrolled several months prior (see Table 1 for the number of sessions each student attended prior to each interview). By using data from multiple interviews, we aimed to provide depth and range in the overall experiences of UB students rather than analyzing the differences between Time 1 and Time 2 interviews. The results of this study do not offer a means of inferring a causal relationship between the UB program and students' attitudes and behaviors about STEM fields and environmental and food justice issues. However, we chose to use some of the tools of longitudinal exploration to enrich our findings by conducting two interviews with each student. In order to gain a deeper understanding of student experiences through multiple interviews, we are aware that we sacrificed the breadth of information that a larger sample would have provided. Despite our limited sample, we did achieve data saturation in both samples in that no new categories or codes were identified in the final 2-3 interviews that were analyzed.

Research Team

The core multidisciplinary research team that designed the interview protocols, conducted interviews, and analyzed data consisted of one counseling psychology faculty member, one educational and developmental psychology master's student, three mental health counseling master's students, three counseling psychology doctoral students, and two curriculum and instruction doctoral students. Research team members' experience with qualitative methodology varied from 20 years of experience to 3-4 hours of training. Each team member was trained by the senior staff of the project on the interview process, coding, and qualitative data analysis.

The research team was racially and ethnically diverse and included one African-American student, one Eurasian and two Asian international students, four White students, and one White faculty member (five females and four males). Throughout this project, we reflected on our experiences to monitor the impact of our backgrounds and values on the data collection and analysis processes. Those researchers who identified as racial and ethnic minorities were inclined to feel connected to the UB students. At the same time, researchers who identified as White related to the students through their political and social justice-oriented identities, which were central to their value systems. Some of the factors that have shaped our interest in STEM and social justice education include our diverse socioeconomic backgrounds and personal interactions with individuals from different ethnic and linguistic groups.

As another means of bracketing our biases, we collectively concurred that the disproportionate number of students of color and female students in STEM fields is a significant social justice challenge that needs to be addressed by psychologists, science educators, counselors, and other professionals. Thus, we affirm the importance of psychoeducational and vocational initiatives that enhance diversity in STEM fields as well as efforts to facilitate CC. While we recognize that the conclusions drawn from this study could have been further triangulated through participant involvement, such as member checks, we chose not to take students away from valuable time engaging with the STEM and social justice curricula, which is the primary priority of the UB program.

Interview Protocol

The aforementioned research team developed the interview protocol throughout several meetings, using the literature on STEM career development, as well as previous research, to inform the content (Blustein et al., 2013). The interview protocol used during the first interview consisted of

29 open-ended questions and was shortened to 25 questions for the second interview in order to reduce redundancy. Interview questions explored students' descriptions of self, future goals, reactions to STEM courses and the UB program, social support and relational influences, and connections between their STEM career exploration and contextual factors (e.g., gender, race, and social class). The interviews were prefaced with a short statement explaining that the purpose of the research was to gain a better understanding of students' experiences in UB, that participation was entirely voluntary and would not affect students' standing or participation in the program, and to provide an opportunity for students to assent to participating in the research. The interviews, which were conducted by members of the previously described research team, took approximately 40 minutes each (see Appendix A for the interview protocol).

Data Analysis

Based on our interest in describing a phenomenon in its natural setting, we used conventional content analysis (Elo & Kyngäs, 2007; Hsieh & Shannon, 2005) to analyze and interpret the interview transcripts. Conventional content analysis involves (a) reading individual interviews repeatedly to gain a sense of the entire data set and to stay close to the original data; (b) deriving codes that represent the important concepts; (c) creating categories that embed multiple codes representing larger meanings; and (d) organizing categories into larger clusters or domains of concepts (Hsieh & Shannon; Patton, 2002). During data analysis, we were mindful of maintaining a high degree of fidelity to the personal stories gathered when collective domains on issues such as race, gender, and culture were drawn.

After the interviews were completed, they were transcribed and audited for accuracy by members of the research team. Initially, the research team members read the Time 1 and Time 2 transcripts from UB students and summarized their observations of the interviews, as well as any

salient changes between Time 1 and Time 2, in a paragraph. Next, the team members convened to discuss their summaries of and reactions to the interviews. In the second phase of data analysis, the research team once again reviewed the transcripts they had summarized and recorded in vivo codes using the exact responses of participants. Following this step, they identified categories and then larger clusters of data (i.e., domains) to provide a broader and in-depth description of the participants' experiences. The research team identified the following overarching domains: (1) social justice; (2) STEM interest and content area; (3) career development and decision making; and (4) relationships (relational, emotional, and educational support). The first three domains are discussed in depth in the Results section. However, as a result of space limitations, we have chosen not to present the results identified as part of the relationships domain due to their limited pertinence to the larger findings of the study (e.g. CC development). In addition, the relational aspects of the findings were not as central to our intention of explicating the social justice and CC aspects of the program.

Next, the research team was divided into pairs, each of which was assigned one of the clusters. Each researcher reviewed the previously identified data categories and relevant quotes to examine whether the patterns that informed the organization of the data into broad clusters were meaningfully related (Hsieh & Shannon, 2005). Through extensive discussion, the pairs achieved complete agreement on the common patterns within the clusters, after which the entire team reconvened to share their conclusions. Throughout this discussion, other team members contributed impressions about the within-domain trends until consensus among all team members was reached. For example, under the broader domain of social justice, four trends were collectively identified: (1) increased knowledge of general and local environmental justice issues; (2) increased awareness in how communities work and how change happens; (3) development of ideas on how to use science and technology to take action to solve problems in the community; and (4) specific ways in which the program facilitated increased awareness and engagement in change. Finally, a smaller group of

research team members met to draw overarching conclusions from the parceled out data. At this stage, it became clear that the domains from phase one (e.g., social justice) and the within-domain trends from phase two (e.g., increased awareness in social justice issues and how social change happens) could be best organized using the conceptual framework detailed in the following section.

Results

Using the components of the UB program and the CC perspective (i.e., critical reflection, political efficacy, and critical action), we chose to organize our results based on a two-dimensional taxonomy comprised of the characteristics of the STEM program along one axis and the attributes of the social justice curriculum along the other axis. This approach fit well with the structure of the interview protocol and with the data itself. We used the participants' understanding of environmental justice and food justice issues in relation to their learning experience in the UB program as a means of organizing their reactions to the STEM education component of the program. Hence, we developed a matrix of three CC domains and two areas of justice – environmental and food justice. For each category of CC, we identified relevant quotes from the interviews along the environmental justice and food justice dimensions. Within the following portion, we explain the broader domains that emerged from the data and provide illustrative quotes for each domain. It is important to highlight that students were not asked to talk about their learning experiences that involved environmental issues. Rather than asking students specifically about what they thought about environmental justice, we elicited their overall understanding of social injustices and how they could use their STEM knowledge and skills to eradicate those injustices.

Environmental Justice

Critical reflection. When students were asked to respond to what they learned about social justice throughout UB, they shared that the program increased their awareness of the environmental

problems in their communities[1]. Perhaps unsurprisingly, students' perspectives reflect initial growth in critical reflection more than critical action. As critical reflection and action are believed to develop in a reciprocal fashion and because action to produce change does not occur without first thinking about what needs to change, these findings are in congruence with other examinations of CC development among marginalized youth (e.g., Diemer et al., 2006; Watts & Hipolito-Delgado, 2015). For example, Jasmine described how UB raised her awareness of the environmental problems. In addition, she talked about the practical questions she tried to answer while addressing specific environmental problems throughout the program. The UB class discussions seem to have contributed to her awakening to the issues that concern not only her community, but also communities with higher rates of environmental challenges:

> We talk about problems in the community a lot and how you can solve them. How can you help the community that you have less problems? We talk about a lot of problems like violence and pollution. So, it helps me see and think more about what's going on. [As a result of attending UB] I actually pay more attention to what's going on around me because at first I didn't think about anything. I live in a pretty quiet place, so I didn't really care about what's going on around. I just lived there, so I didn't really mind about the community, but now I think more of a way to help the community and think about other communities.

Similarly, Carl was surprised to learn about the impact of pollution and how some companies contributed to environmental problems, which directly affected his life:

> I didn't know that what we are learning right now that companies are dumping hazardous stuff, like pollution into the oceans and the land, and it's contaminating our water supply and

[1] The names used for the students are pseudonyms.

air space. I didn't really know much about that until now.

In addition to raising awareness of the environmental factors, UB students reported learning about how one's individual actions and societal problems are reciprocal in nature. Many of the students also conceptualized the environmental problems they discussed in UB as collective matters that have systemic consequences. Within the following quote, Isabel talked about feeling responsible for the environment and other people:

> I learned how everything affects the community. Even the plants, the lights, the bills… Even when you think that all your problems are individual, they're not. They affect everybody around you. If you can't pay your bills, someone else is having problems as well as you. If you're using too much water in your apartment, someone else is not getting enough. Everything affects the community.

As seen in the examples, interviews with the UB students demonstrated that they started to engage in critical reflection of environmental issues. Most of the students emphasized that they were not aware of these factors until they attended the program. It is also worth noting that while students discussed how they became aware of the environmental problems that concern their communities after attending the UB program, they generally did not talk about the relationship between those problems and sociopolitical factors. Nonetheless, these findings may reflect nascent, and perhaps developmentally appropriate observations, particularly as many students voiced not having thought of these issues before they attended the program.

Political efficacy. UB students explained how the program provided them with ideas to engage in social action so that they can make a positive contribution to society using their STEM knowledge, reflecting a core aspect of political efficacy. Students' responses imply that in addition to gaining awareness about environmental issues, they had opportunities to think about their personal

roles in ameliorating those challenges. As discussed in the CC development literature (e.g., Diemer & Blustein, 2006; Watts & Hipolito-Delgago, 2015), several students took ownership of the issues in their communities indicating a greater confidence and motive to take action to improve their conditions. Maria is one of the students who discussed her interest in learning more about which actions to take in order to address the impacts of climate change:

> I learned that right now we have a lot of damages outside, like global warming, but it helped me think about what we could do to make it better and to prevent, you know, the global warming to not go up that much.

Consistent with the transitive cycle of reflection and action in the process of CC development (Watts et al., 2011), some of the responses showed that students' perceptions of their capabilities to address and resolve environmental problems have improved as they gained more information about the ways different communities resolved their problems. For instance, Ashley was able to link her knowledge of efficient use of public spaces to build connections within a community, which could eventually help the community in emergency situations:

> In the class, we talked about how in a heat wave a lot of people in the community didn't really interact with each other ... There were a lot of people that died, and based on that, it was compared to another heat wave because it was a small community where they had parks and people got to know each other. People kept checking on each other, and that decreased the rate of people dying or having serious injury because people checked on each other and it made a difference. So, I think it might make a difference here also.

As these quotes demonstrate, UB students shared their beliefs in using their learning experiences in the program to resolve environmental problems. Teaching activities utilized in the UB

program seem to help students engage in critical thinking around environmental problems and their options to use their STEM knowledge to understand and reduce those problems.

Critical action. Students' increased knowledge and awareness of social and environmental issues appeared to be linked to the changes in their attitudes towards the problems in society and their engagement in mostly individual action to address these problems. Isabel is one of the students who started to pay more attention to what is going on in the environment after attending the UB program. She reported moving towards more eco-friendly behaviors and her efforts to find solutions to the environmental problems she observed in different communities. In her case, UB seemed to provide a supportive space and tools to initiate, again, individual-level action rather than sociopolitical action:

> UB has taught me how to not litter, and be cleaner. It has made me, like when I walk outside, I think about, "Oh, look at this spot! What can we do here?" And, in every community that I go to, I see their flaws and what we can make different and how we can help the community. Then, I bring the ideas here to the UB, and I am like, "Oh, well, this community needs this and that," and they take it into consideration.

Although most of the students stated engaging in personal actions to contribute to their communities, a few students were able to connect their critical reflection of social and environmental issues with the STEM education they gained in the UB program and which they perceived as a tool to create environmental change. Erika was one of the students who valued the role of STEM in helping communities:

> Before [UB], I would think, "Oh, they're putting a new building up in my neighborhood because they want to, because this is what we need," when actually we don't need it. People with a lot of money do it because they want to, and we are the ones who are affected by it. [UB] showed me how to see what's out there and see what's wrong with our community and

why people do things, and what people get out of it, and usually the people that live in the community don't get anything out of it. They don't get profits. Nothing! They just get the effect of the building or whatever was put in the community. And [UB] has taught me how to see those things and how to speak for it … So [UB] has just been opening more ideas for what I can, how I can better things … [Regarding the role of science in solving her community's problems] Depends on what kind of science you use. I mean the science we use here, hell yeah, it can definitely, definitely help. I think it does help the community.

From these responses, students seem to have personalized the curriculum in the UB program to create environmental change, particularly in their personal lives. Most of the students reported going beyond the awareness they developed in the program by engaging in changes at the individual level. Similar to the other domains of CC of environmental injustices, students' responses focused on the environmental problems and how they could utilize STEM to help their communities to overcome those problems. Nonetheless, their responses did not include an explicit understanding of environmental issues in relation to systemic injustices or becoming involved in sociopolitical action to challenge those injustices.

Food Justice

Critical reflection. In addition to reporting their learning experiences related to environmental problems, students shared the ways UB facilitated reflection of the ways in which food is produced, distributed, and consumed. A number of students discussed how they started to think more about the food they eat and the resources of that food after watching documentaries related to the American food industry. Maria, for example, has become more conscious about the quality of the food she consumed:

Well, now, I really think about the food I eat because after I've seen some videos, I just think

about it. Now, I think about the animals that are being treated and where our food comes from, so I think about it more.

The majority of the students reported realizing the high cost of healthy food, especially for those communities with fewer resources. Their responses show that UB provided the opportunity to see the discrepancy in terms of social and economic access to sufficient and nutritious food. The following comment from Carl touches on important food justice issues:

[In response to what he learned in UB] Oh yeah, how consuming the foods that are healthier for us, they are more expensive, and how the foods that are not healthy, they are very cheap. And, also, it [the documentary] talked about how industries would put growth serum in animals to make them develop faster and how that is not actually healthy for us … You see a lot of people buying fast food, not that many people buying vegetables and cooking themselves, so it's like there's a lot of challenges.

Similar to their comments related to environmental issues, students reflected on the quality of the food they consumed with the support of the activities in UB. In addition to learning about the problems concerning access to healthy food in the U.S., students were able to think about the food they eat and question how it was produced. Thus, they seemed to internalize their learning experiences in the program and question the quality and availability of the food they consumed. Students' development of critical reflection regarding food justice roughly paralleled their emergent critical reflection regarding environmental justice as many of them seemed to develop a new perspective about these issues after they attended the program.

Political efficacy. Although students were not asked directly about food justice issues, they showed a strong sense of agency to create a more just society and increasing access to healthy food. Many students talked about using hydroponics, which was part of the STEM curriculum, to improve

the conditions of their communities. Several students developed concrete ideas to apply the scientific knowledge they gained in the program pertaining to the quality of food consumed in society. They also talked about finding the hands-on learning experiences in UB helpful for understanding the STEM concepts, improving their interests in STEM topics, and eventually using their knowledge for the society. Jane was one of the students who shared her excitement about the value of her knowledge of hydroponics:

> The hydroponics part interested me the most because I know that it interacts with that part of my brain that would want to work with animals and plants and it's also exciting for me to do. I don't know how to explain it, but it's just like making a difference in the economy with the plants, how we eat and how it's affecting the earth. I'm really into that … [UB] lets you expand your knowledge on different types of topics that you normally wouldn't have in school like hydroponics because we don't really have it. It gives you hands on experience to show you what people are doing, and it shows you what most people are doing today. It gives you a chance to make a difference and to help you choose what you want to do, and it's very like, like the activities. You get to do a lot of things.

Therefore, students not only reflected on the food-related problems in society, but also developed motivation and obtained tools to put forward scientific ideas to address the problems that concern their personal lives and communities.

Critical action. With regard to challenging food injustice in society, UB students reflected on how change can actually happen and how they could use their STEM knowledge and skills to promote this change. Mark explained what he learned about making a positive change in society, and underlined the importance of being patient and having perseverance when working for change – an important consideration that is often absent from young people, who (perhaps due to a lack of

experience) expect change to occur rapidly (Watts et al., 2011):

> I learned that it takes time to get something finished and that there's going to be challenges and that there's going to be struggle… I used to think that when people said "change," change happens immediately, actively, like they're working on it now, but then you have to be realistic about it. It's going to take time for things to actually change. You have to put effort into it.

Maria provided a more specific explanation about how to use the STEM knowledge she obtained in the program to solve specific food-related problems in her community. She developed an awareness of the problems pertaining to a lack of access to healthy food (and easier access to unhealthy food) in her community. In addition to building efficacy to address these problems using hydroponics, she was involved in the UB projects aimed at developing ideas to overcome those problems:

> We do a lot of work in the hydroponics which is how people can build structures to grow food that can be sold cheap and we won't have any chemicals in there. So, I think that's a pretty good thing because most of the challenges that we face now in the community are about not having space to grow healthy stuff, like nothing healthy. Because many people don't have the time to do it, so they like, "Oh, buy this and buy that," and usually the healthiest foods are more expensive than the not healthy food. So, looking at the videos that they show us, it really made me think, "That's kind of true."

Jane, similarly, discussed the role of UB in teaching her scientific skills to increase access to healthy food. As Watts and Hipolito-Delgago (2015) noted, her example refers to a "group-level action" given that UB helped students take responsibility as a group to respond to the needs of their communities by growing plants:

> With hydroponics, we're actually trying to put them into schools so that kids at school can have fruits and vegetables naturally. We're also trying to make it so that people could have it at home. So you can have plants, all types of plants year round without having to put pesticides or having to worry about other things that you know the people that grow it do. I've learned to do that in [UB].

The interviews reflected that students were able to use the hydroponics activities in UB to engage in action that would eventually allow them to solve food justice-related problems in their communities. Through the hands-on activities in the program, students produced fruits and vegetables which are often more expensive than unhealthy food options (e.g., fast food). Our findings indicate that while several students' understanding of sociopolitical action around food justice issues was not fully developed, some of the UB students had already moved beyond the reflection and efficacy components of CC and engaged in social action using their STEM knowledge and skills (e.g., growing fruits and vegetables).

Moreover, most of the students' responses regarding the concept of social justice focused on food justice issues and how they affected them individually, most likely because they were able to address those issues more readily. As such, students might have had a greater sense of control and agency in terms of growing healthy food than reducing pollution, which is less concrete and a more long-term environmental goal. Based on the interviews, students' critical action in relation to food justice seemed to be more advanced than in relation to environmental justice issues. This finding supports our previous points indicating that students have become more aware, efficacious, and active with regard to tackling food justice issues, yet their CC is still emerging and their comments on these complex sociopolitical and environmental problems are developmentally appropriate. In addition to gaining STEM knowledge and skills that helped them address food and environmental justice problems, UB students valued the program's contributions towards fostering their career development

and planning for college.

Career Development

UB students reported an increased knowledge of different STEM fields and careers throughout their participation in the program. Having limited educational/vocational support from their schools, many students appreciated that UB encouraged them to think about their future and career choices. For example, Ashley talked about how she became more willing to explore her career options earlier in the college preparation process:

> The program has helped me think about what I want to do. It helped me open my interest to things I can do and different options that can help me that I would never thought of before and would be trying to figure out in the last year of high school.

UB students also demonstrated a better understanding of the relationships among their academic performances (e.g., grades), college planning, and career exploration. Many of them shared that during the college and career planning sessions, they realized the importance of college preparation. Isabel, for example, described how her attitudes and behaviors at school have changed since she attended the UB program:

> I've learned what it takes to go to college and the expectation that colleges have, and that you can't just achieve everything by sliding through in school, with having D's. You have to really work at it and put your mind to it. And UB even gave me discipline actually because in UB you can't sleep in class. You can't use your phone. You have to pay attention. It kind of made me realize, "This is how I should be in school too." Now, I am like that in school.

Similarly, Zack shared learning about the long-term consequences of one's academic performance and behaviors at school: "I learned that how you work in school, how your GPA, how your attendance, and conduct will have a big impact on your college years and when you are applying

for college how it will affect you too." Students discussed how STEM and social justice education in UB engaged them in setting future goals and striving to achieve those goals. Erika is one of the students who appreciated reflecting not only on STEM fields and social justice issues, but also her career development:

> UB helped me open my eyes and see the future I have ahead of me and what I can do to achieve what I want with all those social justice classes and the STEM… and basically the part where we get to write in our journals and we get to think about how our days go and what we can change about what has happened.

Lastly, students brought up specific college-related information and support they received in the program and how it helped them better prepare for STEM fields. When asked about how the UB program has helped with her educational and career plans, Jasmine said:

> I never really used to think about it [college], but now that I come here and I think about it more and we learn more things about college now, there are a lot of things I know about college like how to get scholarships… They [UB mentors] tell me how to get to college, what are the steps to get to college, what are the steps to study medicine. It helps me focus more on science and math.

Likewise, Mark pointed out the importance of UB staff in supporting his college preparation which can be a challenging task for urban youth given their lack of resources and/ or mentors:

> [UB liaisons] pushed really looking into colleges, and if you really like the college then we should search it up. Get to know more about it, get pamphlets. They have been very generous bringing colleges to us. That's very helpful because some of us, we really don't have the time to go out to each college. So, I'd say they play a big part in our lives.

These findings suggest that the UB program helped students consider STEM fields in the

future and explore different careers. By mentoring students throughout the college admissions and providing exposure to the college environment, UB helps the students engage in college planning and preparation. For most of the students, UB has been the first educational environment where they started to plan for college, which is likely to motivate them to attend the program and invest in their education. Although these findings do not present a causal relationship with regard to the effects of UB, students' responses show that they have benefited from college and career planning sessions.

Discussion

The results of this study provide a rich exemplar of an intervention designed to highlight the social justice issues that are embedded in the lives of urban high school students, but often disconnected from their lived educational, relational, and social experiences. The UB program incorporated current environmental and food justice issues into culturally-affirming and supportive urban ecology and urban farming education to foster students' interests and academic success in STEM fields. The results indicate that during their time in UB, students devoted considerable thought about the problems related to the environment and food. While most of the students expressed a deeper understanding of the environmental and food justice problems after attending the program, their involvement in social action was more evident in their responses pertaining to food justice problems. Students' comments indicate that UB encouraged them to apply STEM knowledge and skills to take ownership of potential solutions to challenges facing their communities.

Summary and Analysis of Findings

Although making science more relevant for students' lives is one of the guiding assumptions of contemporary science education, there is little research on how helping students use their scientific knowledge and skills to improve their communities and neighborhoods can actually empower them.

Consistent with the positions of Barton and Tan (2010a, 2010b), Diekman et al., (2015), and Akon et al. (2013) regarding the importance of weaving connections between students' communities and science, our participants appreciated learning science as a means of investing themselves in their communities. The findings also affirm that with its social justice-oriented perspective, students' participation in the UB program was characterized by their awareness of environmental and food justice issues and by their knowledge of the tools to address those issues in their local communities. Hence, the results from the content analyses underscore that the CC component of the program played a significant role in motivating students to develop interest in STEM topics along with a budding understanding of systemic problems.

Our findings also point out that students' participation in UB was associated with thoughtful reflections on their career development, particularly in connection to the college and career planning sessions. The UB staff members closely mentored students to help them engage in career exploration and plan for college. The interview data seemed to suggest that the students' invigorated approach to college and career planning may reflect an important enactment of CC. When considering the Diemer findings regarding the relationship between progress in career development and higher levels of CC (e.g., Diemer & Blustein, 2006; Diemer, 2009) in tandem with our results, students' engagement in their future plans may indicate their evolving level of agency. As students became more aware of injustice and more motivated to produce social change, they also developed more capacity for agency in school and career.

This study provides several insights for programs seeking to engage youth in social justice-oriented STEM activities. Our results showed that the students were better able to articulate action steps they could take on issues related to food justice than environmental justice. This is, perhaps, due to the fact that the program was better able to guide and facilitate the students in taking action on

food issues. While the students initiated the idea of growing food to address the food deserts in their communities, the connection to the farmers markets provided a way to make that idea a reality by implementing their ideas and taking specific action steps. A similar connection had not been made for environmental justice at the time the interviews were conducted, and the students' responses related to taking action on environmental issues were much less robust.

As mentioned earlier, we did not ask students about food justice and environmental justice issues during the interviews. Instead, our goal was to understand whether students were able to connect the social justice component of the program with the STEM topics they learned. Students' greater involvement in action with respect to food justice could be related to the tangibility and convenience of growing plants using hydroponics, whereas addressing environmental problems, such as air pollution, may be understood as less tangible and requiring a longer-term commitment. Because food is very central to people in general, it may have evoked greater interest and engagement on the part of the students. In addition, the use of attractive technologies in the food justice part of the program may have functioned to enhance the salience of this particular part of the program.

The equivocal nature of the findings suggests the utility of considering the "bigger picture" with respect to fostering CC among high school students. Following work in environmental action education by Schusler and Krasny (2008) who cited Freire's (1973) assertion that democratic participation can only be internalized through experience, students may need to experience taking action steps in their communities to understand and internalize the action component of CC. However, the specific nature of the two focal problems, as well as students' differential interest and experience in the two strands, may also have influenced this outcome; the current data do not allow for definitive conclusions to be drawn.

It is important that we acknowledge the conflict in having programming that is simultaneously dedicated to increasing upward mobility in a class-dependent system (capitalism) and developing CC, which, by definition seeks to dismantle unjust systems. We admittedly struggle with the tension between transforming inequitable systems and structures, an arduous process, and helping people to thrive in their current contexts, a conflict Prilleltensky and Stead (2011) have called the adjust-challenge dilemma in Critical Psychology. Absent the social conditions necessary for transformational structural change and redistribution of power and resources, perhaps both adjust and challenge approaches are necessary components of transformational change processes.

Furthermore, the development of psychoeducational interventions would be served by more detailed research on different aspects of the present study. For example, while there was some movement of students into "critical action," this component of CC development did not seem as strong for the UB students as the others. The difficulty of fostering critical action, in comparison to the other two components of CC, is consistent with the broader CC literature (e.g, Diemer et al., 2006; Watts & Hipolito-Delgado, 2015). We are hopeful that further research would answer questions such as whether moving toward social action is a function of increased reflection and political efficacy or whether further interventions can be developed to help students translate these two components into action. One fruitful direction for future research is to integrate the work on CC with the Diekman et al. (2015) work on goal incongruity, which underscores the importance of communal and altruistic values in career decisions by women. It may be that students of color also are seeking to enact change in their communities, which may drive some of their career development. Using a social justice perspective in STEM education may help students to make this linkage and may enhance the attractiveness of STEM careers.

One of the more compelling findings in the study was the strong engagement in college and career planning by the students at both interview points. The fact that these somewhat disengaged students became so future-oriented speaks to the effectiveness of the program model. Although the current study cannot pinpoint which aspect of the program (e.g., exposure to mentors and college setting, increased value of career planning or education) facilitated students' engagement in career planning, our findings suggest that the focus on social justice and CC may also provide a rich soil for the students' development of agency and direction. Taking the relevant research and theory into consideration (see Akom et al., 2013; Cabrera, Milem, Jaquette, & Marx, 2014; Kenny, 2013), this finding points to the need for further research on the use of social justice education as a catalyst for school engagement and career development.

Public Policy Applications

From a broader perspective, the findings reported in this study point to some important implications for public policy in urban education, social justice pedagogy, and career development. The rich textual data underscore the importance of instilling an explicit and integrative social justice perspective into urban educational contexts, as reflected in the relevance and engagement that the students reported. One of the public policy implications that merits further consideration is the utility of embedding a social justice perspective into STEM education. An ongoing challenge that STEM educators face is in enhancing the relevance of the curriculum, which often seems disconnected from students' lives. The results from this study, when considered in light of related scholarship (Akom et al., 2013; Barton & Tan, 2010a), suggest that the use of a justice-oriented perspective can serve to make STEM come alive for students in ways that also will benefit their evolving sense of CC. Another important public policy direction is to consider carefully the nature of students' interests and values in their career choices and development. While there is much focus on trying to shape

students' interests, the literature in social and educational psychology on goal incongruity (e.g., Diekman et al., 2015), coupled with the findings reported here and elsewhere regarding the importance of social justice in the lives of urban students (e.g., Akom et al., 2013) suggest that policy makers need to take into account how students view their work lives in relation to their emerging consciousness about themselves and their communities.

STEM education and policy makers may also benefit from integrative efforts that infuse career development into the curriculum, which will help students to understand how their evolving skills can be used in designing meaningful futures. The active involvement of the students as informants in the process provides a critical exemplar for policy analysts and decision-makers. Students who are facing the barriers of poverty and racism are often in the best position to inform the development of new policies and programs. From a macro-policy level, the promising findings presented here are in conjunction with the contributions of like-minded educators and activists (e.g., Akom et al., 2013 Shoffner & Dockery, 2015). Our findings also imply that serious conversations need to be initiated about the barriers to creating an affirming and nurturing context to support marginalized students' STEM career development.

Limitations

While our findings are informative and promising, a number of limitations need to be noted. First, the study was conducted with a circumscribed sample in a specific region of the country. The modest sample is balanced to some degree by the fact that we conducted two interviews with each participant, thereby enhancing the richness of the data. In addition, we interviewed participants twice across an approximately 10-month time frame, but we did not observe many discernible changes in their responses between the two time periods. The program's dynamic structure, wherein students had access to different levels of the intervention based on when they joined and how often they

attended, made it difficult to infer causality from the data analysis. Nevertheless, the findings did yield informative new insights about students' experience in an integrative psychoeducational program, thereby providing important guidelines for subsequent program development and research. Furthermore, like most qualitative studies, our biases may have affected how we interpreted the data; however our attempts to bracket our findings coupled with the use of multiple data points provided us with a viable means of managing this limitation. Lastly, we did not have an opportunity to review the transcripts and findings with the participants, which reflects a limitation in our capacity to triangulate the results.

The UB program is a crucial exemplar of an innovative psychoeducational STEM intervention that is rooted in a CC perspective. Our findings suggest that STEM education for urban youth would benefit from an intentional social justice-oriented psychological perspective, which is one of the unique contributions of this study. As our analyses pinpoint, STEM programs that integrate science education with social justice education and career development components through strength-based, community-focused projects provide a rich vehicle for urban youth to become more involved in STEM education and careers along with motivating them to create positive social change in their communities and the larger society.

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Table 1 *Participant Demographics and Exposure to the University Bound (UB) Program*

Name	Gender	Racial Background	Grade (1st interview)	Program Start Date	1st interview (Number of Sessions Attended)	2nd interview (Number of Sessions Attended)
Carl	Male	African-American	9th	Fall 2010	14/18	10/15

Maria	Female	Latina	9th	Fall 2010	10/18	15/15
Isabel	Female	Latina	9th	Fall 2010	15/18	14/15
Mark	Male	African-American	10th	Summer 2010	22/26	12/15
Zack	Male	African-American	11th	Spring 2010	28/35	12/15
Erika	Female	Multiracial	11th	Spring 2010	18/35	10/15
Ashley	Female	African American	9th	Fall 2010	17/18	12/15
Jane	Female	Latina	9th	Fall 2010	15/18	14/15
Jasmine	Female	African-American	9th	Fall 2010	17/18	14/15

Appendix

Interview Protocol (Time 2)

Description of Self as Student

1) Please tell me a little bit about yourself.
    a. (If students ask "In what way?" reply "any way you like.")

Reactions to STEM Courses and College Bound

2) What brought you to the College Bound program?
3) What do you think of this program?
4) How do you explain College Bound to your friends?
5) As you may know, the College Bound program has classes in science and technology. What science, technology, and math classes have you taken at school and what were those classes like?

   a. How have you done in these classes? Please elaborate.

6) Are you interested in exploring science and technology careers in the future? Please explain.

   a. Why or why not? What are the reasons behind these decisions?

7) Has the College Bound program influenced you to think about STEM careers? Please elaborate ("Can you please tell me more?")

8) What new skills have you learned in the College Bound program?

   a. (If social justice is not mentioned...) What have you learned about social justice in the program?

9) How has the College Bound program helped you to become aware of challenges in your community?

10) Has the College Bound program inspired you to make any changes in your life? Please elaborate with an example.

   a. How about with respect to science, math, and technology in school?

   b. How about outside of school?

11) What do you think helps you the most to do well in school?

12) Is there anything that holds you back in school? Please tell us about it.

13) How will your work now in school affect your life in the future?

   a. (Prompt: do you think there is a connection? Please elaborate)

Future Goals

14) Do you have any ideas about what you'd like to do after you graduate from high school?

   (If no specific answer given…)

   a. What are your educational and career goals at this point?

15) Where do you see yourself in five years? How about ten years?

16) What excites you about the future? What scares you about the future?
17) What makes it hard to achieve your goals?
18) Would you like to add anything about your future plans that we didn't get to today?

Social Support and Relational Influences

19) What are you learning in school about exploring your future plans in school and work?

(If teachers & counselors are not mentioned, ask the following…)

a. Who helps you in school? How do they help?

b. What have you learned from your teachers about your career options?

c. What have you learned from school counselors?

d. What have you learned from school support personnel and your College Bound liaisons, like Mr. Kemp, Ms. Allen, and Mr. DePina?

20) Are there people outside of school who you talk to about your future plans in school and work?

(If no response or hesitation…)

a. How do parents, guardians, or other family members help you with school and your future plans?

b. Do you talk with your friends about your school and future career plans? How do your friends help you?

c. Please tell us about other people who are helpful to you?

(Prompt: If students have not talked about this point...)

i. How do these people outside of school help you with education or career plans?

21) Is there anybody in your life who inspires you? How?

Gender and Culture and STEM Exploration

High School students are much more aware of the impact of race, culture, ethnicity, and gender in many parts of their lives.

22) Please tell us about your cultural background. *[If students ask why we want to know about these issues, please indicate that research has found that one's experience of one's own race, culture, and ethnic background influences many aspects of life, including school and future work plans.]*

a. What languages do you speak at home?

b. What are cultural traditions do you practice at home?

i. Prompt: For example, food; religious traditions; festivals; holidays, etc.

23) Do you think your cultural background affects your educational and career plans? Please elaborate. Why or why not?

   a. Do you think your cultural background affects your opinion of STEM careers?

24) Do you think your gender affects your educational and career plans? Please elaborate.

   a. Do you think that your gender affects your opinion of STEM careers? Why or why not?

25) What do you think we should know about this program that we haven't already asked?

26) The interview is now over. Thank you so much. What was it like talking with me about your thoughts on the program and your career plans?

Note for the Interviewer: Please write a few paragraphs about your own experience doing this interview.