

Youth Voice and Positive Identity-Building Practices: The Case of ScienceGirls

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Abstract

Through two stories of youth voice, learning, and identity development in an afterschool science program for girls only, we show the ways in which such programs can be understood as important identity-building practices. We describe key dimensions of a socio-cultural approach to youth voice, learning, and identity, situated also in the context of the literature on afterschool programs. We then explore the manner in which youth voice and identity were marked by time and space. We conclude with a discussion of youth voice and ethics in collaborative research projects with youth.

Keywords: learning, identity, youth voice, agency, transformation, sociocultural theory, afterschool science programs

Résumé

Grâce à deux études de cas, nous montrons de quelle manière un programme parascolaire des filles peut soutenir des pratiques de construction identitaire. Tout d'abord, nous décrivons quelques dimensions clefs de la voix des jeunes, de l'apprentissage et des pratiques de construction identitaire selon une approche socioculturelle, ancrée dans la littérature sur les programmes parascolaires. Nous explorons ensuite la place de la voix des jeunes

et le travail identitaire, ainsi que la manière dont il est marqué par le temps et l'espace. Nous concluons avec une discussion sur la voix des jeunes et des questions éthiques soulevées par de tels projets de recherche collaboratif.

Mots-clés : apprentissage, voix des jeunes, agence, transformation, théorie socioculturelle, programme scientifiques hors-scolaire

Alana: In school, we have to follow the content and curriculum they give us, but in ScienceGirls, we have a choice; we choose the themes and subthemes, whether it is for the newsletter or the science fair project, so we have more choices. We make decisions by ourselves; it helps us develop our personal curiosity, autonomy and independence.

Samadara: Well, it's like at school you're lower than somebody else—somebody is above you, like the teacher who tells you what to do next. Since you need good grades, you do it well, even if you are not interested. Here, you like to do the newsletter well, and it makes you learn new things. You are useful for something: useful for somebody else [since you teach others about science by writing about it].

(Focus Group Interview, Spring 2010)

The above exchange took place during a focus group interview at ScienceGirls, an afterschool science program for girls only. We talked about what the girls enjoyed about the production of the scientific newsletter that was then distributed to the elementary schools in the program's vicinity. Both girls were long-term participants in ScienceGirls. They initially participated in the regular afterschool activities and science fair projects and now contributed scientific texts to a science newsletter, an activity that was reserved for girls in their last year of elementary school and high school. Alana was one of the youth animators, guiding newcomers' development and writing of scientific texts and editorials. In the exchange above, the girls hint at the manner they were positioned in ScienceGirls and in school. As noted by the girls, youth voice and agency were supported in ScienceGirls, given their position as agents of their own actions. The afterschool program was a space where youth could follow up on interests and skills they brought with them and developed through participation. It was also a place where they could write about scientific topics of interest to them and then share their developed expertise with others and help them discover science. In contrast, the school is described as a place where they lack voice and where they are positioned as the passive consumers of a curriculum that

is already laid out for them and which they have to master in exchange for a grade that might get them through the educational pipeline.

The exchange hints at what happens when youth give meaning to who they think they are, can become, and can be within the different educational spaces they navigate. That kind of authoring of self in relationship to the program, its activities, and science, is tied to how the program activities are lived by the girls, a dynamic we are interested in investigating in this article. We are particularly curious about how youth's perception of self can both limit their forms of engagement in practice yet at other times make accessible new possibilities (Nasir, 2012). As suggested by the exchange above, the girls saw themselves as having no control over the curriculum in school and identified themselves as passive learners in that context, which attests to its effect on their forms of participation. In contrast, in ScienceGirls, the girls had access to new possibilities of learning and becoming. To them, significant identities in science were available. Therefore, one can argue that they co-opted the program and had voice. Their position as learners was grounded in the program's logic of mutual respect between adults and youth. It is in this sense that we also see a close link between youth voice, learning, and identity. The three constructs are interrelated and offer a valuable analytic heuristic to understand the developmental and educational value of afterschool programs in conjunction with other educational contexts in the lives of youth.

In addition, given our theoretical grounding in Vygotsky's theory and its relational perspective of environments and actors, we explore how youth voice, learning, and identity take shape in and emerge from practice. We take for granted that such identity work takes multiple forms and shapes over time, and are particularly interested in that diversity. Our theoretical grounding in sociocultural theory calls for a focus on youth and youth voice, leading to questions about who they are, how they are positioned and position themselves in practice, and how youth's positioning work then constitutes practice. It calls for a focus on how youth voice their concerns, author themselves, take action, and endorse agency. Hence, we take for granted that "the production of voice is always situated, socially determined, and institutionally organized" (Juffermans & Van Der Aa, 2013, p. 112), as the exchange among the girls at the beginning also attests to.

Below, we first lay out some key dimensions of a sociocultural approach to youth voice, learning, and identity in practice. We also explain what we mean by positive identity-building practices in light of the literature on afterschool programs in general and in

science in particular. We outline the methodology and in turn, through two case studies of youth, offer illustrations of youth voice, learning, and identity in ScienceGirls. We also show in what ways the two girls' perceptions of self as learners and their dispositions to science led to two very distinct learning trajectories over time. We conclude with the implications of such an analysis for understanding youth's learning and identity work grounded in youth voice.

Youth Voice and Positive Identity-Building Practices

Sociocultural theory recognizes children and youth as competent social actors. It conceives of youth voice as plural and emerging from mediated action. Youth voice is also being jointly produced among actors in practice in the present, yet it is simultaneously grounded both historically and politically (Cammarota, 2011; Kirshner, 2010). Accordingly, we conceptualize youth voice in this article not as a property of individuals that is being shared publicly, but as enacted and as having its origin in practice and thereby as transformative of practice:

Giving voice to children is not simply or only about letting children speak; it is about exploring their unique contribution to our understanding of and theorizing about the social world that children's perspective can provide...it is about the intellectual promise of positioning children as social actors. (James, 2007, p. 262)

The case studies of the two youth in this article are essentially stories of social action. They offer an illustration of how the two youth "consumed" practice in ways intended, yet also in ways that suited their needs and went well beyond the program goals and objectives. That complex dynamic of reproduction and agency is how we conceptualize youth voice, a vision also emergent from current theoretical explorations and new models of lifelong, life-wide and life-deep learning (Bell, Tzou, Bricker, & Baines, 2012). Accordingly, youth voice, learning, and identity are understood locally within an afterschool science program. Yet, simultaneously, we explore youth voice globally, across the lifespan of individuals. We study youth voice forward and backwards in time and space, and focus on how voice was experienced over time within the program but also elsewhere, and how these experiences in turn add up and constitute youth's learning and identity

projects. Essentially, we trace youth voice, learning, and identity across space and over time, which helps us to get at a more nuanced account of why people learn, when, and how. As such, learning and development are understood as an affective engagement or “becoming who we want to be” (Lemke, 2000, p. 286).

The agentic dimensions of wanting to become somebody, of seeking out certain learning opportunities while ignoring others, and of positioning one’s self in certain ways but not others, are all understood as acts of agency and youth voice. They simultaneously lead to a focus on what constrains or enhances “different actors’ capacity to make oneself heard” and to the manner actors end up navigating learning spaces. A focus on agency helps re-orient research toward questions about “who is being heard when” (Juffermans & Van Der Aa, 2013), and underscores the great variations in supports and learning opportunities that exist across communities. Simultaneously, they make possible the study of how individuals “arrange and transform the conditions of their own learning in relation to their expectations, interests, concerns, and available resources” (Bell et al., 2012, p. 271). It is the latter dimension that we explore in this article. As such, we also assume that learning and identity need to be understood together. Learning is about knowing, doing, and being a certain person. More specifically, in the context of science, girls’ learning and identity are tied to their perceptions of self, arrived at through ways they are constructed as learners of science, on how girls in particular are positioned (in school and elsewhere), and how they position themselves in reaction to such assigned positions by creating new positions for themselves or by transforming old ones. It is that interplay of participation in and positioning of self in practice that we explore in this article and that we assume can be captured in a thorough exploration of youth voice, learning, and identity in practice.

The study itself is situated in an afterschool program, which we consider an important site for youth development, supportive of the development of positive cognitive, affective, and behavioural characteristics such as competence, confidence, character, connection, and caring (Deutsch, 2008). Nasir (2012) reminds us that “learning and identity are not constructed out of thin air” (p. 132) but embedded in and emergent from learning settings that put youth in tune with tools, such as knowledge that youth value, next to forms of participation and identities that they can take up and that are embedded in rich relationships with adults and others, grounded in respect and joint work (Vadeboncoeur & Rahal, 2013). Quality afterschool programs focus on youth voice and “individual

validation.” They are also driven by high expectations and responsibility while offering “a sense of belonging and a balance of autonomy and support” (Deutsch, 2008, p. 197). Quality programs are coopted among youth and adults and made relevant through such agency. They provide youth with meaningful learning and quality relationships. They also offer youth developmentally appropriate roles (Rahm, 2012; Vadeboncoeur & Rahal, 2013). As shown elsewhere (Rahm, 2012; Rahm & Gonsalves, 2012), ScienceGirls is a program that offers most of its participants a space that they care about and can come to own, something the opening dialogue also confirms.

ScienceGirls is also unique given its focus on the development of a diverse set of competencies through engagement with science, competencies supportive of academic success and lifelong learning. The program offers specifically girls a safe space to engage with and show an interest in science, co-opt science, and thereby make it meaningful to them (Bell, Lewenstein, Shouse, & Feder, 2009). As other such programs, it offers stimulating science activities and opportunities to learn about science careers through activities that are embedded in rich intergenerational contexts and may challenge gendered messages about science that girls typically juggle with and that may have an impact on their career choices (Calabrese Barton et al., 2013). Quality afterschool science programs can also offer girls opportunities to question science and their relationship to science in ways meaningful to them, as the article by Gonsalves in this issue suggests. For these reasons, we refer to ScienceGirls as a positive identity-building practice. Our analysis of its science practice suggests that it offers girls rich opportunities to engage with science and to play with identities in science (Rahm, 2010). Changing forms of participation over time also make engagement with science and the program developmentally relevant (Rahm, 2012).

Method

The two case studies in this article come from data collected in the context of a multi-sited three-year ethnography of science literacy development and identity work in science that we pursued within and beyond two afterschool science programs over time (Marcus, 1998; Rahm, 2012). We purposefully selected the two cases among a group of six youth whom we followed over time in the program. They illustrate two distinct trajectories of

learning, identity, and voice within and beyond the program. They help us understand shared and unique features and patterns and offer two unique illustrations of how such trajectories take form over time. We first describe the program, before we offer an overview of the data sources and the analysis that we pursued for this article.

ScienceGirls

ScienceGirls¹ is an afterschool program that has been in existence since 1987, serving diverse urban girls from two elementary schools and one high school in an underserved community of Montreal. The goal of the program is to offer girls an array of science activities that encourage them to develop the tools they need to complete high school and pursue higher education. During two academic school years (2008–2009 and 2009–2010), we followed a group of 12 girls each year, ranging in age from 10 to 14 years, with six girls participating in the two consecutive years of the study, as they engaged in the making of a scientific newsletter. The participating girls have a diverse immigration history, with parents from Morocco, Congo, Caribbean, Greater Antilles, Bangladesh, and Sri Lanka.

The program offers activities every afternoon after school in a community centre. One afternoon is reserved for the science fair, other afternoons for diverse science experimentations and topics, and Friday afternoons for the scientific newsletter team, the activity we studied. The afternoon session begins with a snack and group brainstorming of tasks for the day, followed by individual or teamwork in the computer lab and writing of the articles. The topic of each newsletter is decided upon together (e.g., music, nature, school and science, the universe, biodiversity, the human body, and oceans and continents). The genres of texts the girls were encouraged to write varied widely, ranging from popular science texts to interviews and questionnaires, documentation of scientific experiments, poems, crossword puzzles, and games.

1 The program is known under the name “Les Scientifines,” which we have translated as ScienceGirls for this article. Pseudonyms are used for all youth and animators.

Data Collection and Analysis

For two years, we collected field notes and video data of the making of the newsletter, following the production of two newsletters in the first phase of the study (January–May 2009), and five newsletters the following year (Fall 2009–Spring 2010). Each year, we conducted individual semi-structured interviews of the twelve participants, the three lead instructors, and the program director. The interviews with the youth focused on their reasons for participation, their interest and identity in science, and their descriptions of the newsletter activity as well as other science activities in the program and in school. The interviews with the instructors focused on their perception of the program and their role as well as their notions of science. We then pursued focus group interviews of a subgroup of six girls in the spring of 2010, 2011, and 2012. In the winter of 2012, the same subgroup of six girls participated in the production of a video documentary about ScienceGirls, which was presented at a scientific meeting and is currently available on the program website. We followed up on similar themes: what they enjoyed about the program, how they perceived the role of the program in their life, and how they thought about and felt about themselves in relation to science. We also collected all the newsletters and informal conversations and email exchanges we had with some of the girls over time. The two girls we focus on in this article were part of almost all of these activities.

Analysis entailed a sampling of all the data sources pertaining to the two girls, Alana and Mohini. We developed a timetable of their forms of participation in ScienceGirls over time, beginning with their engagement in the program while in elementary school, which they shared with us in the interviews. We also analyzed the three focus group interviews of the following years (2010–2013). We transcribed a representative selection of all interactions that the two key figures were involved in as they participated in whole-group discussions (choosing a theme for the newsletter or discussing upcoming tasks) and as they guided other youth in their writing of the newsletter. Mohini became more involved in the science fair projects over time, and we relied on news briefs about her competition results as another source of data to build her case.

Using Spradley's (1980) semantic analysis, we identified some of the different forms of participation in science that the two girls engaged in over time and also identified segments that offered insights into their positioning in the program as youth and learners of science. The interviews (two individual interviews each, and three focus group

interviews) were analyzed in terms of their identity work, how they described the program and themselves as participants in it, and how they articulated their relationship to science over time. These data sources then led to extensive case studies and stories of the two girls. Each case is a complex bricolage of multiple data points that are simultaneously also grounded theoretically in sociocultural theory.

The stories were also co-constructed among the three authors of this article, who had been engaged in the research project in different ways over time. The first two authors often collected data together with youth and collectively engaged in data analysis. The third author (Alana, who is simultaneously one of the subjects of this text) was invited to comment on a first draft of the article and contributed to its revisions. Her documentation of Mohini's engagement in the program through a project in college also served as data and was woven into the final article. In this way, we tried to not only document youth voice through the data already collected but also attempted to mobilize youth voice in terms of how the two cases were constructed and, in turn, presented in the article. Essentially, the three authors of the article took on the role of bricoleurs and, through tinkering with research methods and interpretations, arrived at two stories of learning, identity, and voice (Kincheloe & Berry, 2004). For reasons of consistency with other writings about the program and its participants, we used pseudonyms for the program and youth in the article. However, the fact that we wrote the article together is acknowledged officially in the disclosure of the authors' real names. All the data were collected in French and translated only after analysis, for the purpose of this article.

Results

Identity in the Making: Who I Am and Who I Can Become

Youth voice, learning, and identity are explored in the context of two stories of youth—Alana and Mohini—who are still engaged in activities with ScienceGirls, and whom we had a chance to follow over time. As noted earlier, Alana, the third author of the paper, also contributed to the writing of the stories.

Story 1. Alana: “To understand the news you need science!”

Alana has been with ScienceGirls since her third year of elementary school, having joined the program at the age of eight. Alana and her brother were born in Canada, but their family is from the West Indies. They manage and own a restaurant in the city and additionally have clerical jobs. Alana shied away from the science fair projects because the science fair intimidated her. She preferred the science newsletter activity in which she had participated since fifth grade, as highlighted in the quote above, which reveals her disposition toward science—which she sees as a tool to understand the world. Once in high school, she was offered the position of a youth assistant in the newsletter activity and given the task of guiding her peers in their writing. She was also in charge of the editorials. She recalls one of her editorials as particularly interesting:

I like the length of the article, the manner I managed to engage the reader. I talked of myself personally, I talked about others, and I like the manner I wrote it, the literary quality of it. Comparing it with others, this one is longer but well structured, and it shows that I put much effort into it. (Interview, 2010)

For Alana, ScienceGirls was like a second family and a place “to get a break from the boys” and be among girls. As later mentioned by the director of the program, “the dynamic really changes here, the groups are smaller than in school, the relationships with the instructors are different, the authority changes.” These dimensions were highly valued by Alana and later also embodied by her in her position as a youth instructor. As a youth assistant, Alana’s forms of engagement in the program changed. She now assisted others in framing their articles and facilitated the development of the scientific questions on a topic of interest to them. For instance, one team was working on a text about chocolate. They were asked to realign their topic with the theme of the newsletter, “The Human Body,” which prompted Ajala to propose the following:

Ajala: So then, how does the body taste the taste of chocolate?

Alana: Wait, you need to rephrase it. That does not really work.

(later) Maybe we could say, what are the kinds of tastes that the tongue is able to distinguish?

(Transcription of video, Winter 2010)

Alana offered a reformulation more aligned with science, trying to keep the team on task. In other instances, Alana assisted girls in choosing a topic for their article, as shown below, where she guides Ajala toward a topic that is pertinent to a newsletter on animals, and then helps her develop it scientifically:

Ajala wants to do an article on an animal and brainstorms together with Alana, who lists “dogs, cats, giraffe” to get her started. Ajala adds that she wants to talk about an animal from India, her country of origin, and Alana continues with a new list: “tiger, elephant...” Ajala opts for the elephant and they brainstorm about some of its symbolic meanings in India, such as the trunk being high up in the air bringing good luck. Later, they discuss different ways to approach a scientific text on elephants, talking about threats to its survival and differences due to its various places of origin, such as Asia as opposed to Africa. (Condensed field notes, January 8, 2010)

Through such forms of engagement over time, first as a participant and then as a youth assistant in the newsletter activity, Alana’s positive disposition toward science as a tool for action was further reinforced. She particularly enjoyed the social action component of a scientific newsletter in that it helped her share her passion for science with others and thereby make science accessible to others:

I think it is important to inform others about science, it is important to understand science. I like to read different kinds of sciences and technology. And I think all science is important: it helps us understand ourselves, our environment, our society in which we live, and the human sciences. I do not have a passion for the pure sciences—mathematics, chemistry, physics. I prefer the human side of things, like sociology, psychology, maybe physiology, but even then, that is too technical for me. I like thinking about things. (Interview, 2011)

Despite her strong positive disposition toward science, Alana like many other youth in ScienceGirls, distanced herself from the hard sciences. Instead, she described herself as somebody who enjoys “understanding science” and “thinking about things” and the “human side of things.” Her sustained engagement in ScienceGirls also led to the development of many competencies, which in turn constituted her identity work in new ways, as suggested next:

Being involved in the journal helped me discover that I was good at writing. I learned how to write for public outreach through my involvement in ScienceGirls. The structure of an article, to find an eye-catching title, all that, that's what I learned over time, and that made me think of maybe becoming a journalist, so for a long time, I also wanted to become a journalist... But then, I started to become interested in psychology, simply because of the human contact... I knew that as a psychologist I would also have a lot of things to write. (Interview, 2011)

Her interest in science was continuously reinforced through her sustained engagement in the program, which also made her curious about journalism and later psychology, with the latter being well aligned with her interest in "helping others." In the program, she also practised the latter indirectly, as she supported her peers' writing of texts while also counseling them on personal struggles in school or at home. The latter interest was further reinforced as Alana was offered a chance to pursue her volunteer work at ScienceGirls:

I started taking up the role of a volunteer at ScienceGirls when I was in Grade 7. I was growing up and was looking to get more active. I knew I wanted to do volunteering but didn't know where I could do something really interesting for me, at such a young age. I was 14 at the time, and I didn't think of ScienceGirls because, having been used to a sort of passive position in school, I didn't quite yet see myself as being able to do more than be one of the girls who participates in the afterschool program. (Informal conversation, 2014)

While Alana initially questioned her ability to take on the role of a volunteer for ScienceGirls, the position made accessible to her as yet untried roles and forms of engagement, which led to new challenges and kept her involved in the program in new ways:

When I showed my personal interest in wanting to get more involved in community work, the animators there were quick to remind me that a non-profit like ScienceGirls is the perfect place to put in volunteer time and really be valued for it. And that's when I became a regular volunteer. Then with the years, I took on different roles—mentor, role model—and was given even more important opportunities through the program. (Informal conversation, 2014)

Through her position as a volunteer and community spokesperson, Alana participated in scientific meetings, presenting the program to the research community, while also becoming involved in showcasing the program at special events organized among local community organizations and schools in the context of professional meetings and events, such as school-drop-out prevention week or cultural community events.

Later, Alana took on the role as a paid instructor in the ScienceGirls summer camp, offering scientific activities to groups of children from camps in the community during the summer, and also in an elementary school during the year. This coming summer, she will take on the role of the coordinator of all camp activities. Taken together, these opportunities and diverse forms of engagement in the program over time not only offered Alana a safe space to voice her concerns and develop her voice but also contributed in important ways to who she has become:

And that is really what is most incredible about this program. Besides more “practical” aspects—such as learning how to write well, gaining scientific knowledge, learning how to manipulate scientific ideas, and figuring out which sciences are more or less interesting—all the different skills and experiences that help us grow and gain different competencies and learn about ourselves in general and contribute to who we are, that is probably one of the most important things about this organization. I can honestly say that I would not be the same person today had my mother not signed me up at eight years of age for ScienceGirls. And because it is a place where you have the room to create your own experiences, I really made the most of the years. I was a part of the organization as a youth, and now continue to be a part of it because it is a part of me. Part of my identity is completely tied to my role as a volunteer and mentor at ScienceGirls, in the same way that I also identify myself as being a girl, a sister, a daughter, a student, a dark-skinned person, or as having African-Indian blood lines, a young adult in 2014. (Informal conversation, 2014)

Through her engagement with the program over time, Alana developed a sense of belonging that is reciprocal. She profited from her participation yet also became eager to stay involved and to give back. Such a sense of self and voice was supported through the different forms of participation that Alana had access to over time and that were developmentally appropriate. They coincided well with her personal interests and her disposition

toward science. The changing forms of participation that ScienceGirls offered over time were challenging, given the level of responsibility and engagement they demanded. Yet, taken together, they led to a sense of belonging, empowerment, and agency not all participants experienced or would take advantage of in ways Alana did. Many left the program once they moved on to high school. In contrast, Alana is currently pursuing a bachelor degree in psychology at a local university and has kept up her volunteer work at ScienceGirls.

Story 2. Mohini: “The program breaks like a bubble that often exists around science.”

Since the fall of 2013, Mohini, now 17 years old, has been enrolled in a prestigious private college in preparation for university, after having been in the enriched track in science and math throughout high school. For her, ScienceGirls did break a bubble that existed around science. Initially, she saw science as something her brother would pursue, while doubting her own participation in science (Rahm, 2012).

Mohini came to the program with an interest in science and knew that she “want[ed] to work on something with science” one day. At the beginning of high school, she described her relationship with science as follows:

The sciences, I find them very important, because without science we could not heal people. There are so many things that we could not do if there was no science, and I like everything, but the thing I like most is evolution. I am not sure how to say it, but I find it was really my history teacher that taught me all about the beginning of life. He talked to us for two days about the Big Bang, it was so interesting—I loved it! (Interview, 2010)

Mohini had a long history of engagement with science and can be described as a youth with a persistent interest in science (Bell et al., 2012). It influenced in important ways how she sought out ScienceGirls over time. She started participating in the program while in elementary school. Having just moved to the neighbourhood, she used her engagement as a means to become part of the community and to make friends. She already enjoyed science, which was another draw. Since it was a place for girls only, it felt like a space that would help her overcome her shyness and support the development of her

self-confidence and autonomy. Overall, she always enjoyed the science fair projects: “We could make the posters, which helped me develop presentation skills, and we could communicate our findings to the public.” It was “an activity that helped me pull together different skills and mobilize competencies that I had already developed a little at school.” In fact, it was her lack of oral communication skills that made her move away from the newsletter activity and become exclusively involved in the science fair projects, once she was in high school. As Mohini explained,

Even though I am still shy and afraid of public speaking, when I did the science fairs it was like doing theatre. I became somebody else, and it was no longer me that people saw but my character. In the context of science fairs, I put it in my head that I was like a teacher that was presenting to students...so even if I was still somewhat shy, in that position I knew that I knew my topic better than them, and I was the person that made them learn new things. (Interview, 2013)

Mohini purposefully engaged in science fair projects to overcome her shyness and struggles with public speaking. To overcome her position as a youth unable to do so, she presented herself as a person engaged in theatre, an interesting play with identities. She also positioned herself as knowledgeable about science. These two ways of identifying herself were temporary, yet they became the tools she needed to succeed in the challenging task of presenting science to the public.

The science fair projects at the elementary level are an in-house activity, with a science fair that is open to the public and community. It was only once we had studied the newsletter activity that the program also introduced a science fair activity to a small group of adolescents; they then took part in the provincial science fair competitions, and for this reason had to adhere to the guidelines such projects entailed. Mohini was one of the first active participants in that group and also became the first recipient of a gold medal in the Canada-wide science fair competition, which made her finally—and for the first time—publicly announce her interest in science:

Since the Science Fair experience, I am more open now to say to others, “OK, I love science...” There will be people that find me strange, but hey, now I can say it to others, that I enjoy science, that I love science.

Interestingly, she appeared to need the public recognition that she received through her medal at the science fair before she felt self-confident enough to fully assume her identity in science.

Mohini's persistent interest in science also came through as she opted out of her role as a youth instructor, a role that Alana treasured. Mohini also struggled with her decision, noting "While I really like to do volunteer work [and work as a youth instructor in the newsletter], I felt strongly too that I wanted to just write and do it myself." And still later, as she became more heavily involved in her science fair projects, she ended up dropping the newsletter writing altogether to free up more time to devote to her projects. Yet, she also felt that she could pursue science "at a deeper level. When you write a text you have less time to spend on it, but for the science fair, you can have a lot of time for the topic." She also enjoyed working alone, which was possible with science fair projects.

ScienceGirls helped me see science differently and opened my eyes to the vast universe of science. It helped me discover areas of science I was unaware of before, like the research on the immune system, which interests me particularly at this point and in which I like to pursue a career. (Interview 2013)

For Mohini, engagement with science also always involved her family. Mohini was born in Switzerland to parents from Sri Lanka. Her mother eventually moved on to Canada when Mohini was eight years old, with her younger brother, then four years old. Her father remained in Switzerland, where he works as a cook. Her mother works as a pharmaceutical technician, since her teaching degree in mathematics was not recognized. Yet Mohini often referred to her mother as a scientist and highly valued her advice and support for science (Rahm, 2012).

The science fair project for which she received the gold medal entailed the study of antimatter and cancer and discussed the use of proton and heavy iron therapy for cancer. Mohini struggled to find a topic and went to see one of the instructors at Science-Girls, noting "I love astrophysics!" This prompted the instructor to talk about antimatter and the European Organization for Nuclear Research (CERN), which eventually led to the project, as described by Mohini:

I googled astrophysics in Wikipedia, and then I ended up with antimatter and decided to do a project on that. And then I spoke about it with my little brother and my mother, and then we realized that my project had no clear objective. So antimatter, yes. It is interesting, but so what? What good will it do for society? That's when I checked out information about the use of antimatter, and that's where I saw medicine, which caught my attention. That's how I stumbled on cancer, but initially I was scared to work on cancer. I did not know much about it, and when one does not know something very well, one is afraid to work on it. But then, once working on it, especially the angle of antimatter, it got me to cancer and now I really like it. (Interview, 2011)

Later, when talking about her presentation of the project to the public, she highly valued the feedback she received about its social implications and "how it had an impact":

There was a person who came to see me, she told me that my project really touched her, since her nephew just got diagnosed with cancer, and [she said], "We are thinking of treating him with proton therapy, but we do not know too much about it and its impact."

This led Mohini to explain in great detail the positive and negative effects of that form of therapy and thus gave her an opportunity to practise her public-speaking skills and to engage in sharing her understanding of science and using it "to do good," something she valued. Initially, Mohini's interests centred primarily on physics; only later did she manage to tie physics to issues in the health sciences. This led to her second science fair project, which involved the study of an extract of cocoa polyphenols (EPC) and its use in treating inflammatory diseases such as psoriasis. The pursuit of that project was made possible through her work in a research laboratory on immunology at one of the local universities during the summer months, testing molecules of the cacao plant.

Reflecting on her involvement in science fairs, Mohini referred to her unease at times, given her ethnicity: "Most of the participants were "Québécois de souche."² But then, "last year we were a little bit more mixed, the ones coming from Montreal, and in

2 Term used for a native-born francophone Quebecer, sometimes also referred to as "old-stock Quebecers."

the delegation we told Canadians that we have one language, different cultures, and then I really saw myself as an insider... but since I come from another country, it's clear that it is always more challenging for me to identify myself as being from Quebec." But it was not only her ethnicity and history as an immigrant that positioned Mohini in certain ways in science. In some ways, growing up in an underserved community constituted yet another barrier toward becoming an insider to science.

It is only some years later that I really realized that ScienceGirls is a program that offers a special support for youth from underserved communities. And I remember going through a phase in my life when I was ashamed to be coming from such a neighbourhood. It is only through ScienceGirls that I realized that living in an underserved community does not have to be shameful. It is just a fact. It has helped me to become really better, to be more open and helped me understand other youth that experience the same kind of feelings of shame or feel like that right now in light of the neighbourhood they grow up in and in terms of their origins.

As is evident, Mohini's interest in science was always present and well nurtured through her participation in ScienceGirls, but it took her time to develop the confidence needed to publicly share her interest in science and announce that she would pursue science in the future. It took time for her to be comfortable enough to enter the world of science that she experienced at times as being mostly white and possibly not for girls coming from the kind of neighbourhood she had grown up in. Only over time did she manage to reconcile her identity as a girl born in Switzerland to parents from Sri Lanka, as well as being a first-generation immigrant and Québécoise of colour, with pursuing a career in the health sciences. When she returned from a family visit to Sri Lanka in the fall of 2012, she spoke with pride of her origins, yet she also alluded to the fact that she felt lucky to be in Canada where she had access to a quality education and to programs like ScienceGirls, which had made science accessible to her.

Discussion: New Possibilities of Voice, Learning, and Identity

Follow your interest, no matter what and go ahead with it. Never stop or drop it; stay with it and persevere. (Mohini, 2011)

Through snippets of their stories, we have shown how two youth lived their engagement and identity work in science within and beyond ScienceGirls. Engagement in the program over time left both girls with new possibilities of voice, learning, and identity. Their learning trajectory in the program took shape over time, as did their disposition toward science, their identity in science, and their identity as learners who wanted to become somebody. They found ways to navigate the program that reinforced dimensions of themselves they were keen on developing further. Participation over time also helped them test out and play with identities that were not necessarily accessible to them elsewhere. For instance, Alana flirted with an identity in science that led her to pursue a university degree in psychology, whereas Mohini developed her disposition toward science in the program by becoming involved in science fair projects, which in turn made new opportunities accessible to her that offered important entry points into the science pipeline. Interestingly, she also needed that kind of public recognition in order to voice her interest in science beyond the safe space of ScienceGirls. As noted by the director of ScienceGirls, “Mohini always struggled, taking decisions.” Her involvement in the science fair projects over time forced her to take decisions, a skill that is important in terms of not only science but also future pursuits that align with her persisting interest in science. She has to remain strategic in order to pursue science as a career, something she seems to be well aware of, and does well, given her support by ScienceGirls and family.

Interestingly, both girls positioned themselves as brokers of science and craved some kind of engagement with science for the common good. Alana described her continued involvement in the newsletter as a means to reach out to others. She was also eager to voice her interest in science and in getting others involved with science and ScienceGirls. Her community involvement as a volunteer in ScienceGirls became a means “to give back.” In contrast, Mohini’s pursuit of different science fair projects and her choice of topics made possible the addressing of real-world concerns, such as finding a new treatment for cancer or identifying a less costly and more effective treatment of psoriasis, her latest science fair project. It is in this manner that ScienceGirls supported youths’

interests and gave them the space and opportunities needed to build on and further develop their interests in science. ScienceGirls is marked by a level of flexibility and openness to youth-owned and youth-driven science to which schools, for instance, are not always well disposed (Calabrese Barton et al., 2013). Yet it was not solely program flexibility and youth voice that mattered: respect for youth and supportive relationships with other youth and adults in the program over time also nurtured the development of a sense of belonging that was unique and that led to the development of an identity as an agent of change, as Alana suggests:

And I think that that sense of belonging is really what has allowed me over the years to take my place in this organization and let my voice be heard, and gain a sense of empowerment. Feeling like you belong makes you know that you are valued, that your voice is valued, and gives you the confidence and the latitude to explore different possibilities for yourself, possibilities through which you grow, and seeing myself grow was a great source of empowerment. Seeing yourself learn, mature and grow, and not simply “age” and follow the “already written out for you” path that is the educational pipeline, is really empowering, enlightening, encouraging, eye-opening... As well as understanding more about myself, I now understand a lot more about my community, the neighbourhood, and the importance of non-profit organizations for such a neighbourhood. I have gained a sense of community through my participation in ScienceGirls, something I know Mohini has also gained, as the interview I did with her suggests. That was very much expressed, that she is proud to be from that area, and she also noted that through her participation in ScienceGirls, she was able to gain a voice and become known in the community, which is also true for me. And that sense of community also motivated me to pursue my participation in this organization and to encourage others to do the same. And that sense of community has also formed part of my identity, as an active youth from Little Brice. I have a lot in common with others who have done different things in different programs and organizations, but share that same sense of belonging that I initially had at ScienceGirls, which has furthermore extended to the rest of the community, and that is also part of who I am. (Written comment, 2014)

Alana's comment helps reorient research toward questions about "who is being heard on whose terms and under what conditions" (Juffermans & Van Der Aa, 2013, p. 116). The quote above offers a summary of the kinds of conditions in place at ScienceGirls in support of youth voice and action. And as also suggested by Alana and Mohini, youth voice was tied to their forms of engagement, learning, and identity development within and beyond the program over time. Through participation in ScienceGirls over time, Alana and Mohini had access to many unique learning opportunities that were conducive to the kind of identity work at the heart of youth voice and action. In that sense, by looking inside ScienceGirls together—another condition for being heard—we could identify and name the dimensions that make for a developmental setting supportive of youth voice, healthy identity work, and youth's life-long learning (Deutsch, 2008).

Our article also raises important questions about ethics of voice in anthropological studies of educational practices (Juffermans & Van Der Aa, 2013). By including the voices of Alana and Mohini, in addition to having Alana contribute to the writing of this article, we tried to put away positivist ideas about keeping our research objective and, instead, invited youth to dialogue with us about our interpretations of their discourses and actions that we recorded over time. We went beyond studying voice in the discourse we analyzed and, instead, attempted some kind of joint production of the research reported in this article. While important and interesting, it does not yet fully represent youth participatory research, in which the actual pursuit of research is "a collective process" and understood as "enriched by the multiple perspectives of several researchers working together" (Camarota & Fine, 2008, p. 5; see also the article by Livingstone, Celemecki, and Calixte in this issue). While not without its challenges, research of that nature is certainly important if we are serious about action and transformation of the current educational landscape in ways empowering to youth and conducive to positive identity work and lifelong learning.

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