

Fostering Bedouin students' sense of place in the light of place-based education and third-space theory

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19.1 Introduction

Sense of place – a concept that describes the fundamental relationship between people and places – has been noted by environmental researchers as a key component in understanding and encouraging environmental behaviour (Ardoin, 2006). It is based on the idea that people's relationship with a place affects their attachment to it and desire to reside in it, encouraging them to care about the place's environmental health and strengthening their commitment to protect it (Avriel-Avni et al., 2010). A primary assumption in environmental education research is that to develop a strong sense of place, students should deepen their understanding of their surroundings through hands-on, outdoor learning. Place-based education takes place outside school walls, in the students' local environment, and therefore strongly is based in a paradigm of outdoor learning. The place-based learning experience is designed to develop a sense of responsibility and encourage students to become involved in the goal of achieving local ecological and cultural sustainability (Woodhouse & Knapp, 2000).

Our study followed a group of young Bedouin students (initially fifth graders, aged 10) throughout a three-year, place-based education program conducted in their local environment, examining that program's influence upon the students' sense of place. These students live in small, rural villages along the banks of the Hebron Stream in Israel's Negev Desert. This stream is an environmental hazard, with contamination by sewage runoff and mounds of dumped waste along its banks (see Figure 1). We conducted this program in tandem with an extensive project we designed to rehabilitate the contaminated environment in which these students live.

Creating an authentic place-based program that would be relevant to the environmental, social, and cultural issues that concern these particular students required a detailed characterisation of the place in which they live and the students' relationship with it. We therefore drew upon Homi Bhabha's (1994) notion of the third space to create data collection tools that accurately would reflect the students' understanding and experience of their environment. We enlisted students from our target population as participants in our research tool development process, which incorporated multiple cycles of interviews with small groups of students, who orally completed and provided feedback on different iterations of a gradually developing questionnaire. These interviews served as a third space in which to conduct a 'negotiation' between the concepts and categories Western tools employ for measuring nature connectedness and the experiences and worldview of the Bedouin students. The 'negotiation' then continued throughout the program's implementation, defining the program's content as well as our analysis of its influence. In this chapter, we describe the process of developing and implementing our place-based education program, highlighting the critical role third-space theory played in creating it and in gaining an accurate and comprehensive understanding of its results.

Figure 1: Unrecognized Bedouin village on the banks of Hebron Stream



19.2 What is ‘sense of place’ and why is it important?

‘Sense of place’ can be defined broadly as the meaning and importance individuals or groups ascribe to a given setting, based on their experience within it (Stedman, 2003). In this context, the term ‘place’ refers not just to a place’s natural, environmental, and physical elements, but also to its cultural and social characteristics (Ardoin, 2006; Stedman, 2003). As a result, sense of place reflects the complex web of lifestyles, meanings, and relations associated with a particular place at a particular time by an individual or group of individuals (Garavito-Bermúdez & Lundholm, 2017).

Despite the concept’s complexity, scholars have agreed on a combination of two complementary principal aspects of sense of place: place attachment and place meaning (Haywood, 2014). Fundamentally, *place attachment* refers to the bond between people and places and reflects how strongly people feel attracted to places, while *place meaning* deals with the symbolic value people ascribe to places (Kudryavtsev et al., 2012). Place meaning serves as the reason for place attachment and depends on the value characteristics people ascribe to places (Stedman, 2003). As Manzo (2005) notes, “it is not simply the places themselves that are significant, but rather what can be called experience-in-place that creates meaning” (p. 74).

Most studies on ‘sense of place’ focus primarily on people’s positive experiences in a healthy natural environment (Manzo, 2005). However, to expand the meaning of the concept beyond this context, we must learn more about people’s relationships with natural spaces that are contaminated or unsafe (Kudryavstev et al., 2012). The setting of our study sets it apart from most sense-of-place research because it offers an opportunity to examine the sense of place of individuals who live in an unsafe, contaminated environment. This is especially important in light of the fact that experiences in unsafe environments are no less powerful and significant than positive

experiences in healthy environments and no less influential in shaping individuals' relationships with their environments.

19.3 The relationship between sense of place and place-based education

Sense of place begins developing at a young age. Indeed, Briggs et al., 2014, and Morgan, 2010 identified childhood as a critical period in its development, during which place meanings and attachment begin to form and subsequently influence development of an individual's identity. One issue concerning researchers is that this bond is being disturbed as children's access to positive experiences that encourage a personal bond with their local environment has declined (Castonguay & Jutras, 2009). The situation is worse in poorer areas, where there are more problems and fewer resources and where opportunities for positive encounters with places are less frequent. There is therefore a worry that individuals and communities that lack a sense of place will not care much about that health of their local environment nor have concern about maintaining it.

In light of these concerns, environmental researchers and educators increasingly emphasize sense of place and connectedness to nature, based on their potential role in curbing the environmental crisis and promoting a more sustainable future (Lankenau, 2018;). The last decade in environmental education has focused on creating programs designed to strengthen children's connection with natural places, emphasizing the importance of spending time in natural environments to the forging (or re forging) of nature connectedness and sense of place (for example, Cheng & Monroe, 2012; Liefländer et al., 2013). Strengthening this connection between people and places is one of place-based education's primary goals (Gruenewald, 2003; Kudryavtsev et al., 2012; Woollorton et al., 2020).

Place-based education is an educational approach that emerged from a perceived need to bring students closer to their local environments and the particular problems that affect them (Smith, 2002; Sobel, 2004; Woollorton et al., 2020). As such, we can view it as a countermovement, responding to dominant educational cultures that focus on global or abstract issues that bear no tangible relation to place (Eijck, 2010). Though place-based education is a relatively recent term, it draws upon and shares qualities with other educational approaches, including community-oriented schooling, ecological education, bioregional education. This approach considers indigenous ways of knowing, and the role of power historically contextualized within a space (Dean, 2021; Woollorton et al., 2020).

Place-based learning must take place in an environment that is authentic (Braund & Reiss, 2006) and provide opportunities for hands-on learning (Lavie-Alon & Tal, 2015). Place-based approaches to environmental education focus on the problems and the benefits of a particular place, using these to teach students to be sensitive to the needs of the environment, to understand environmental problems, and to promote sustainable solutions. Place-based education is therefore critical to the field of environmental education – not only to encourage an environmental conservation ethic among learners, but also to make learners aware of the deeper social, ecological, and political forces embedded in places (Smith & Sobel, 2010).

19.4 The Bedouins and their relationship with place

The Bedouins of the Negev Desert are an indigenous people, a sub-group within the Arab minority in the State of Israel. While the Negev Bedouins are Muslims, they are a distinct sub-culture owing to their close ties to the desert landscape and the lifestyle that evolved there before 1948. The Bedouin economy has, for most of their history, been semi-nomadic, structured around seasonal migration with herds, with women, children, and elders left behind to tend a specific familial territory, and men returning to their designated homes periodically in accordance with the seasons (Al-Krenawi, 2004). This means that, though nomadic, individual tribes historically associated over time with a single, continuously populated place.

For much of their history, the Bedouins, like other indigenous communities around the world (Abu-Saad, 2008; Holt, 2006), relying directly on local natural resources for survival and using these resources in a sustainable manner. The Bedouins' traditional agricultural activities and lifestyle adapted to the natural cycles and seasons of the desert, overcoming water scarcity by capturing and storing water flows in seasonal creeks and streams during winter through a system of stow dams and terraces (Abu-Rabia et al., 2008). Abu-Rabia (2002) describes the Bedouins' ecosystem knowledge, which resulted in traditional land management practices for sustainable grazing. He claims the Bedouins roamed in specific environments in the Negev ecosystem because of the abundance of a combination of green vegetation and stubble (*hasida*) that provided a rich and balanced diet for flocks. The wild herbs they gathered were both food and medicine and generally had higher nutritional values than cultivated vegetables (Abu-Rabia, 1999). Overall, this was a community of people whose lifestyle moulded to suit the specific requirements and characteristics of their environment and who were fully aware of the importance of their place in providing pasture and drinking water for both people and their livestock (Abu-Rabia et al., 2008).

Like other indigenous populations, however, Bedouin society has, over the past several decades, undergone a relatively rapid process of urbanization and modernization. In the Bedouins' case, this came by their close proximity to other, sedentary populations with vastly different lifestyles and further expedited by the sharp decrease in land left available for the Bedouins' use, as areas they had been accustomed to living on were reallocated by the state for other uses. As a result, approximately 50% of the Negev Bedouins now live in state-recognized townships, while 34% live in unrecognized villages, and the remaining 17% live in recently recognized villages. Unrecognized villages do not receive municipal funding and suffer from a lack of infrastructure. Moreover, any domestic structures formally classified as 'illegal' are under perpetual risk of being torn down, so they tend to be temporary, composed of light substances such as fabric, tin, or wood. Whatever their legal status, all of the Bedouin localities rank lowest in socio-economic indices in Israel at large and remain the most underdeveloped in all areas, including education, infrastructure, industry, and commerce (Rudnitzky & Ras, 2012; Sedawi et al., 2019).

One basic municipal service these settlements lack is the organized collection and disposal of household and other rubbish. As a result, the residents must dispose of this themselves. Studies of settlements with similar waste-disposal issues show that the

lack of the means and knowledge for proper disposal, together with the combined inaction of the government and the community in addressing this lack, can lead to environmental and health problems like foul smells, the agglomeration and reproduction of harmful insects and bacteria, and the outbreak of infectious diseases (Ismail et al., 2017). The disposal method currently employed in the unrecognized and recently recognized Bedouin villages involves backyard burning of household waste, dumping household and agricultural wastes in unregulated dumps in and around the settlements. Storing bulky waste such as asbestos in backyards and dumping waste in streams and streambeds (Sedawi et al., 2014). It is worth noting that practices like incineration or leaving waste to biodegrade worked reasonably well when Bedouin communities were smaller, nomadic, and generated waste that was almost entirely organic. However, the waste generated by the Bedouin villages whose children participated in our study is an amalgam of miscellaneous packaging materials, diapers, aerosol containers, cardboard, glass, etc., all of which also constitute part of the children's environment (Meallem et al., 2010; Sedawi et al., 2020).

Despite the recent fundamental shift away from the traditional Bedouin lifestyle, various elements of it still remain. For example, raising sheep, though often no longer financially beneficial, is still common practice in unrecognized Bedouin settlements, both as a domestic source of meat and milk and as a means of preserving a traditional lifestyle (Degen & El-Meccawi, 2009; Meir, 2018). Caring for and herding sheep is generally a task reserved for women and children. From an early age, Bedouin children are expected to make an active contribution to their household, gradually taking on various age-appropriate tasks designed to help support their family. This means that, even today, Bedouin children have much more direct, daily contact with their natural environment than urban children do (Ben-Zvi Assaraf et al., 2012; Sedawi et al., 2020). In addition to helping with the livestock on their family farms, they spend a great deal of time outdoors, herding sheep and playing in nearby fields.

Bedouin children in the Negev also far more directly are impacted by adverse environmental conditions than urban children tend to be. Many of them walk several kilometres to get to school, crossing streams that can become impassably blocked by flooding on rainy days. Since much of their home environment is unpaved, rain can turn their immediate surroundings into an inconvenient, muddy quagmire. At the other extreme, life in the desert exposes these children to the dangers associated with extreme heat and dry weather, such as heat stroke and dehydration, as well as water-born infections due to the lack of proper plumbing and local hazards like scorpions and toxic plants (Elsana et al., 2014).

19.5 How do Bedouin children understand and experience their environment? Developing research tools in the 'third space'

To design a place-based education program accessible and relevant to this particular group of children, we first needed to learn more about these children's lives, particularly about their relationship with their immediate environment. Most of the tools developed for describing and assessing children's relationship with nature were designed for relatively affluent European or American children (see, for example, Cheng and Monroe 2012; Liefländer et al., 2013; Thompson et al., 2008), but, as we noted above, the lives of Bedouin children are markedly different from those of

children growing up in urbanized, Western environments. As various critics, including Duhn (2017), pointed out, researchers of children's relationship with nature must beware of a "tendency for universalizing childhood," since "how a child engages with spaces ... differs enormously" according to the "environments where one's childhood is located" (p. 1365). These potentially extreme differences in the experiences of children from different cultures in different places raise the very real possibility that tools, and studies developed for children in one place will be based on assumptions about these children's everyday lives that are wholly inapplicable to the lives of other children. Our first task was therefore to create an information-gathering tool that accurately would reflect the lives of our target population.

Despite their potential limitations, we concluded that standard tools for measuring relationships with nature could be a useful starting point from which to begin to construct our research tool. To use such tools productively, however, we needed to ask ourselves: How can we make the students' experience 'communicate' productively with the theoretical concepts defined in the literature? To facilitate this 'communication,' we drew upon Homi Bhabha's (1994) notion of the third space, which serves as a theoretical framework for researchers interested in understanding and (re)negotiating the relationships between Western perceptions and the culture of individual, non-Western communities. The theory seeks to explain and address the tensions and conflicts that can arise when several different cultural identities come into contact. It has been applied in a wide variety of disciplines, including architecture, ethnology, cultural studies, linguistics, and education (Cook, 2005), including specific applications in research into science and environmental education (for example, Lowan, 2012; Wallace, 2004). As Glosson et al. explain:

The local indigenous culture provides meaning and identity to community members in the first space, while Western ideas (e.g., Eurocentric science) provide a second space for learning in schools, often in European languages. However, students and community members must function in a third space to negotiate meanings and understandings for the intersections of knowledge, practices, and languages from merging cultures. (2010, p. 128)

This process of negotiation generates change, creating hybrid interpretations of science and the environment. The third space generates a shared foundation between indigenous and Western perspectives, a place in which to engage in dialog, where "multiple discourses may be woven together without sacrificing or dismissing the importance of their speakers' experiences and ways of knowing the world" (Wallace, 2004, p. 908).

In what follows, we present the seven-stage process through which we developed our questionnaire, adapting it to the culture of the Bedouin students who live in the Negev's unrecognized settlements (see also Sedawi et al., 2021). We suggest that this development process can itself be perceived as a third space – a site for continuous dialog between the framework of the Western assessment tools and the specific experience of the Bedouins. In that space, we literally *negotiated* with a group of students from our target population over the form and content of the questionnaire until we produced a version comprehensible to the students and reflective of their experience.

19.5.1 Stage 1 – Creating a bank of statements

We gathered the statements from the first version of the questionnaire from two sources. We drew most from a variety of existing tools for measuring ‘connectedness to nature’, most prominently Cheng and Monroe’s (2012) CNI (connection to nature index), adapted specifically for children. However, we also conducted semi-structured interviews with ten Bedouin students in order to gather information about their experiences and perceptions of the nearby natural environment. The interviews included questions like, “Tell me, what natural places near you do you like?”, “What places do you not like and why?”, “What animals do you raise/like?”, “How do you feel when you are in the natural environment near you?”, and “What bothers you when you are in the natural environment?” Based on the students’ responses, we created new statements that used simple, local language and drew upon the students’ own experiences. Stage 1 produced a preliminary bank of 46 statements, written in Modern Standard Arabic and divided according to the four categories of nature connectedness suggested by Cheng and Monroe (2012), namely, enjoyment of nature, empathy for living creatures, sense of oneness, and sense of responsibility. To these, we added an additional category, ‘experience of nature in my immediate environment,’ with statements drawn from the Bedouin students’ interviews.

19.5.2 Stage 2 – Preliminary testing of the students’ understanding of the statements

To test the statements gathered in Stage 1, we conducted interviews with 12 groups of students from two separate villages. Each group consisted of four randomly chosen students who participated in two consecutive group interviews, each of which covered 23 of the 46 statements. During these interviews, we read aloud the statements in the questionnaire, one by one. For each statement, we asked the students to note if it was clear, what, if anything, they did not understand about it, whether they agreed or disagreed with it, and why.

These group interviews revealed several obstacles. For example, many students had difficulty understanding some of the more abstract or general statements like, “My actions will change the natural world”, or, “I like to hear the different sounds in nature.” They asked, “What are sounds in nature?”, and “What sounds do you mean?” Other statements, such as, “I enjoy gathering rocks and shells,” were either irrelevant to the students’ lives, or incompatible with their experiences. Though we removed the reference to shells from the statement (there are no shells in the desert), the students viewed gathering rocks as a dangerous activity that could be harmful to others (“the rock might hit someone and hurt him”). Another example of a statement that our students found irrelevant was, “I would always prefer spending time with my friends to spending time alone in nature.” This is a reverse statement we designed to test respondents’ sense of identification with nature. However, the students’ responses indicated they play with their friends outdoors, *in nature*, that their nearby natural environment is where they play, and that spending time with their friends is therefore inseparable from spending time in nature. Thirdly, the preliminary test revealed a linguistic obstacle, since the everyday Arabic spoken by the students is very different from written Arabic, and this made it difficult for the students to read and understand the translated statements. Finally, we designed the original questionnaire to be marked

on a Likert scale, with answers rated between 1 and 5. The students never had used such a scale; they had difficulty rating the extent of their agreement between “not at all” and “very much,” and particularly were confused and frustrated by the “not sure” option.

19.5.3 Stage 3 – Consultation with experts

Following the preliminary testing of the original questionnaire, we consulted a variety of experts, asking for their feedback on the questionnaire and on the students’ responses to the initial testing. These experts were of two types: (a) experts in environmental education and science education, (b) educational and environmental professionals who work in daily contact with the Negev Bedouins. The experts in the latter group were particularly helpful in improving our understanding of the social and cultural characteristics that may have shaped the Bedouin students’ perceptions of the questionnaire. We met with each expert separately, describing our preliminary testing experience and the challenges we had encountered. The experts commented on our findings and expressed their opinions regarding the reasons underlying the students’ response to the various statements. We also asked specific questions, such as, “Tell me about the lives of children in the Bedouin community; how does a day in the life of these children look at school, in the village, and at home?”, “How are beliefs, values, and norms reflected in these children’s education, especially their environmental education?”, and “What sort of difficulties or challenges have you come across in your work with children from the Bedouin community?”

The interviewees raised a variety of issues in response to our data and our questions. The environmental education supervisor, for example, raised the issue of the Bedouin students’ relationship with nature. For example, she noted the statement “My actions will change the natural world” is problematic, because Bedouin children see themselves as part of nature and are therefore unclear about what it means to “change nature.” She also addressed the practical impact of the environmental conflicts the Bedouin community faces and their lack of resources. She explained that “environmental education in the Bedouin community is peripheral ... the students live in a polluted environment ... that lacks waste disposal and infrastructure, which makes it difficult for them to apply the things they learn in the educational activities in their homes.” The circumstances in which they live, she pointed out, make it difficult for these children to be agents of change and engage in environmental activism. She therefore recommended that all statements referencing environmental behaviour be rephrased as ‘willingness’ to act and protect the environment, rather than as a statement of the act itself. Thus, for instance, a statement like, “I protect the nature around me”, would be replaced by, “I am willing to protect the nature around me.”

The two Bedouin teachers addressed the students’ experiences in their immediate environment, as well as their relationship with that environment and their language. For example, they emphasized the importance of the local Bedouin dialect and the concepts the students used in their daily lives, which differ significantly from concepts in the literary Arabic of the questionnaire. This gap, they pointed out, made it difficult for the students to understand the statements. They therefore suggested adding words from the local spoken language to the questionnaire (for example, using the local word for “pasture” instead of the literary one, and incorporating a local term that refers specifically to “hills surrounding the olive trees”).

19.5.3 Stage 4 – Revision of statements based on the results of Stages 2 and 3

The student interviews and the expert feedback led to significant amendments to the questionnaire. Many statements we substantially altered or removed completely and replaced with new statements. Furthermore, in light of the students' frustration with the Likert scale, we reduced the number of options to two (agree/disagree). After we finalized the statements, we also gave each a visual illustration that reflects its content. We designed this to help overcome language barriers and increase the students' interest and motivation.

19.5.4 Stage 5 – Testing the revised questionnaire

When we completed the revised questionnaire, we tested the new version using the same method we had employed in Stage 2, with the same groups of students. This round of testing revealed that some of the illustrations did not fit the statements to which we assigned them, or were not representative of the children's culture, so the questionnaire underwent another round of development.

19.5.5 Stage 6 – Readjustment of illustrations and statements

After testing the original illustrations, we made adjustments to make sure each illustration represented the content of the statement. We also made sure to provide illustrations of both boys and girls, wearing colours and clothing appropriate to the students' culture. We designed the illustrations to be relevant to the students' everyday lives (representing only activities and objects the students would recognize and identify with).

19.5.6 Stage 7 – Adding a formal 'explanations' section to the questionnaire

The experts had suggested the questionnaire should provide flexibility for each respondent to express their own personal perceptions and experience. The students already had been doing this informally during the first two testing stages, and this input had provided a great deal of additional information. We therefore decided to add a new section to the questionnaire, in which we invited the students to provide open-ended explanations for their responses to specific statements (to say, in their own words, *why* they agreed or disagreed with them). The students' explanations ultimately provided a great deal of qualitative data about their relationship with nature, revealing critical nuances that would have been undetectable by their answers to the closed questions alone.

The final form of the questionnaire allowed us to conduct an in-depth exploration of how the particular cultural, social, and environmental factors that shape the lives of children in the unrecognized Bedouin villages of the Negev impact their relationship with their natural environment (see also Sedawi, et al., 2020). Our findings showed the Bedouin students have ambivalent and complicated feelings about their connection to nature. Their responses suggested their awareness of their environment's contamination leads them to avoid contact with natural spaces and fosters a sense of helplessness based on the idea that they lack the ability to take responsibility for their environment. The results also revealed a wide range of specific factors that influence students' relationship with their environment. Some rooted in

their experience of living in a highly rural home environment, which influenced their perspective on things like playing in nature (“... it’s fun to slide down the dunes, I bring a piece of plastic, sit on it and slide,”), safety concerns (“... the water in the stream is dirty and causes sickness.”), weather conditions (“... in the winter there’s mud, I can’t go to school with mud... .”), and instrumental views of nature (“I hunt pigeons and raise them. When the eggs hatch, chicks come out and I sell them.”). Others were rooted in socio-cultural factors, like religious beliefs (“I like to see nature clean, because the prophet said, cleanliness comes from faith.”), traditionally distinctive gender roles (“I don’t like herding goats because that’s boys’ work.”), and tribal territory and affiliation (“I’m willing to clean only in our people’s space; everyone should clean in their own people’s area.”). All of this extensive data ultimately informed the choices that went into the design of a place-based education program specifically tailored for the Bedouin students living in this area – the Hebron Stream Study Unit.

19.6 The Hebron Stream Study Unit: An authentic place-based program relevant to the environmental, social, and cultural issues that concern these students’ relationship with their place

The Hebron Stream Study Unit spanned 36 hours of teaching per year, over three years. Its purpose was to help the students develop an in-depth understanding of authentic environmental phenomena in their surroundings, while encouraging a deeper sense of place. Importantly, the education program was part of a larger regional project that also included the rehabilitation of the heavily polluted Hebron Stream on the banks of which this Bedouin community lives, and the introduction of a new waste disposal program, including the establishment of waste treatment systems in the Bedouin community. We incorporated into the program explicit observations of and discussions about these changes to the students’ environment, engaging the students in reflection about how such developments were – or were not – changing their relationship with their environment.

The program took place during school hours and consisted of a combination of indoor and outdoor learning. We built it around four field trips per year – some in the students’ village environment, some around Hebron Stream, and some at other streams located on nature reserves with healthy ecological systems. Each trip was preceded by two hours of preparation, in which students discussed their experiences and emotions regarding the village and the stream, received introduction to basic concepts (stream, tributary, creek, etc.), played card games such as ‘gifts from the stream,’ watched film clips about the impact of waste on water pollution and on animal life, and more. We followed each preparation with two hours of in-class knowledge integration activities. In these, the students reported the results of their observations from the field trip, defined socio-environmental problems they observed while on the field trip, conducted comparisons between a ‘healthy stream’ and a ‘sick stream,’ examined photos they took on the field trip, and arranged these photos according to the interaction between the stream and the vegetation, animals, people, etc. At the end of each school year, the students participated in a series of additional ‘summarizing and looking ahead’ activities. These included constructing a model that described the students’ vision of a future stream, learning about various solutions for managing and preserving water resources, and multiple activities we designed to

encourage the students to take responsibility and develop their sense of competence as agents of change.

This ‘negotiation’ that had begun in the questionnaire development process continued throughout the program’s implementation, defining the program’s contents as well as our analysis of its influence. Table 1 presents a sample of the program’s activities. It shows how each topic drew upon components from the ‘first space’ (eliciting knowledge from the students’ own experiences in their local environment) and upon components from the ‘second space’ (familiarizing the students with elements drawn from Western science and culture). Finally, it shows how the program created a third, transformative space, in which the students could harness, examine, and combine ideas and experiences from multiple sources of knowledge.

Table 1: First-, second-. and third-space activities in the intervention program

Experience of indigenous knowledge and my local environment	Experience of Western knowledge and perspectives	Third space: ways knowing are negotiated
<i>The stream as an ecosystem</i>		
<ul style="list-style-type: none"> * Developing sense of place by identifying and expressing personal feelings toward the village and stream environment (via drawings, games). * Observations to get to know the immediate environment and develop an understanding of human-environment interactions. * Introduction to local animal species, going to the stream with guides to identify the animals in relation to their desert environment. 	<ul style="list-style-type: none"> * Introduction to traits of stream in general, how created, its parts, and the qualities of desert streams specifically. * Introduction to natural water sources and their characteristics; what is a healthy stream within a functioning ecosystem. * Observations to characterize the stream in a nature reserve, as a resource and a habitat: gathering data and observation of its hydrological components and its function as a habitat. Affective experiences during visits to healthy streams on a nature reserve. 	<ul style="list-style-type: none"> * Creating an ‘ID card’ for Hebron Stream with information drawn from both personal and local knowledge of their home environment and new knowledge of the stream as part of the ecosystem. * Reflective comparison between Hebron Stream and a healthy stream. * Reporting results of inquiry, with emphasis on socio- environmental problems present in the local context. Discussing local socio- environmental problems in the context of the stream as a water resource.
<i>Waste treatment in my village</i>		
<ul style="list-style-type: none"> * Introduction to components present in our waste, connection between our consumption practices and the waste we produce. * Inquiry activity: the waste situation at home, at school, our consumption habits and the waste we generate. * Local methods of waste treatment in my unrecognized village (burning and throwing into stream) and their negative effects. 	<ul style="list-style-type: none"> * Introduction to types of waste sources and generators. Information re quantities. * Learning the route taken by waste, from collection bins to the landfill. * Introduction to the environmental impact of waste, with emphasis on harm to open spaces. * Introduction to the concept of combined waste management, and to solutions like ‘reduce, reuse, recycle’. 	<ul style="list-style-type: none"> * Environmental social dilemmas in the context of waste treatment in my village and compared to other villages. * The implications of introducing Western waste management practices into my environment. How open spaces in my environment been affected?
<i>Connection between waste, the stream and challenges related to biodiversity</i>		
<ul style="list-style-type: none"> * Describing the relationships they have seen between local plants and animals and the waste in my environment. * Identifying and characterizing animals (especially birds) drawn to the waste around the stream. * Working in groups, telling stories of animals harmed in the village environment, particularly by waste. 	<ul style="list-style-type: none"> * Introduction to problems caused by waste, with emphasis on water pollution and its impact on humans and animals (emphasis on birds and butterflies). * Meeting with experts on monitoring birds and butterflies, experiencing research practices like ringing and observation through telescopes, and reporting the results. * The importance of birds and butterflies to the ecosystem. 	<ul style="list-style-type: none"> * Reflecting on environmental social dilemmas in the context of animals harmed by exposure to pollutants, drawing upon personal experience and local knowledge about the importance of biodiversity.
<ul style="list-style-type: none"> * On-site observation of the stream reclamation process. * Drawing pictures representing their vision for the future of the stream and its integration into the fabric of the village. 	<ul style="list-style-type: none"> * Introduction to combined solutions for reclamation of water habitats; introduction to water treatment. * Observing and describing the rehabilitated portion of the stream, noting changes to the stream, as well as nearby animals, plants and human activity. 	<ul style="list-style-type: none"> * A critical perspective on the rehabilitation process, noting practical limitations of the rehabilitation process. * Raising and discussing dilemmas related to the stream as a natural place versus a managed environment.

In its third year, the program expanded to include intergenerational encounters, in which adults from the students' community shared stories about their community's rapidly vanishing traditional past, including traditional Bedouin strategies for sustainable living. Through discussions with their elders, the students learned about the socio-environmental history of their place, gathering information about local plants and animals, and learning stories from members of their community that emphasize their traditional lifestyle and Bedouin society's historical reliance on nature.

Students also learned about traditional Bedouin practices during a tour of the Wadi Attir Project (<http://www.sustainabilitylabs.org/wadiattir/>), which demonstrated an approach to sustainable desert agriculture that combines traditional Bedouin values, know-how, and experience with modern-day science and cutting-edge technologies. Following the tour were in-class knowledge integration activities, in which the students reported the results of their observations from the field trip and compared the ecological footprint of traditional Bedouin society to that of Bedouin society today. At the program's conclusion, the students, accompanied by their mothers, prepared a presentation and conducted an information tour in the students' school, introducing students in other grades to the importance of their village's social and natural environment through an intergenerational perspective. This activity is multi-generational, and the mothers' involvement contributed to increasing the students' engagement in the process.

19.7 Before and after – Assessing the program's influence

Our analysis of data from multiple sources throughout the three-year implementation of the place-based education program showed it influenced the students' sense of place in a variety of important ways (see also Sedawi et al., 2019). Like the development of the initial research tool and the implementation of the program itself, our analysis of its impact also emphasized the importance of allowing the students to express their perceptions, experiences, and opinions in their own voices. To this end, in addition to observing the students throughout the program, we also employed two additional research tools: drawings and semi-structured, in-depth interviews. Drawings are a well-established methodology for examining how students make sense of a given space and identifying meanings in students' lifeworlds, not least because they allow students the freedom to express their knowledge without limitations of language (Alerby, 2000; Avriel-Avni et al., 2010). In this study, we deployed the drawings in two stages – before and after the completion of the intervention program. We asked the students to make two drawings at each stage, describing (a) *my village* and (b) *the stream in my environment*.

After the students completed their drawings (both before and after the study unit), we conducted semi-structured interviews with them to gather additional information the drawings did not provide. The pre-interview described how the students experience the Hebron Stream area, how they perceive the stream itself, the practices involved in their experiences of the area, and the perceptions and intentions that underlie these practices (for example, "What places in your village do you like/dislike? What changes would you make to it?", "Describe the stream to me. What do you feel towards it?"). The post-interview conducted two years later, we designed as a reflective activity in which the students addressed any changes their perceptions had

undergone following the study unit, focusing on how they now perceived the stream and the importance of changing its condition. We presented each student with the pre- and post-pictures they had drawn and we asked: “What are the differences between the two pictures you drew?”, “What changes have occurred in the village/stream?”, “What do you think about these changes?”, and “How do you feel about the stream/village?”

We conducted additional semi-structured interviews with students and their mothers following the intergenerational activities in the third year. The students’ interviews included questions as, “What do you think of your meeting with people from the tribe?, What things were new/interesting to you?, and “What did you feel during the presentation in the classroom?, Was it important for you to present?, Why?”. The mothers’ interviews consisted of questions like, “How did you feel when you saw your son present?”, “What do you think about the program in which your son participated?”, and “Do you feel there have been changes in your son’s attitudes and behaviour?”

A comparison of the pre- and post-results showed that after the intervention, Hebron Stream became a much more positive part of the students’ sense of place than it had been before. In their pre-interviews, 92% of the students described the stream as an ugly place filled with waste that spoils the landscape, noting details like, “there’s garbage in the streambed, an old mattress, cans, old diapers, dead animals, bottles, bags.” Far from seeing it as part of their home, some students expressed the wish that it would disappear altogether, saying, “I want them to cover up this stream. It’s not important at all. I say they can block it up and it would be better.” Furthermore, 67% of the students dismissed the stream’s importance as a natural resource and even described it as harmful to the environment, making statements like, “the stream has no value. It’s just garbage,” or noting more specific problems like, “animals drinking from [the stream], eating bags ... and dying, and then [people] throwing them in the stream.”

After the program, many of the students drew a cleaner, more aesthetically pleasing stream, and about a third drew a stream as a ‘healthy’ ecological system. The students’ explanations of their drawings showed a rise in their awareness of the stream’s importance as a natural resource. For example, one student explained,

The stream is very important. It collects rainwater and runs it to a different stream or the sea. Without the stream there would be floods. Animals drink out of it and there are plants to which it gives water. And there are plants in the water that the turtle and the ducks eat. Around the stream there are plants that I didn’t know before, like saltbush, cattail, soft rush, thorn tree. I also got to know the eagle and the hyrax and the ibex ... All these animals near the stream ... it is very important.

Descriptions like this one reflect the impact of the program’s incorporation of field trips to other, healthier streams. These field trips included exercises in scientific observation, in which the students identified different types of plants on the banks of the stream and conducted observations to identify animals and note signs of their presence (for example, tracks, droppings). The plants and animals students encountered in these observations not only featured in descriptions like the one cited

above, but also in about a third of the students' post-drawings (see Figure 3). The drawings and interviews describe the stream as a nice, clean, aesthetically pleasing place, full of the plants and animals they observed on their field trips to the nature reserves. One student explained, "the stream is prettier when it's clean ... we'll look at the birds and the flowers around it." This student's remark reflects those of others in that it does not strictly describe the stream as it *is*, but rather looks ahead to how it *could* be.

Another element of the program that opened the students' eyes to the possibility that their own environment could be different was the intergenerational activities with adults from their own village. Like the visits to the healthy streams, the intergenerational discourse provided the students with a *comparative* view of their physical environment. In this case, however, the comparison was of their own environment at two different points in time – past versus present.

Figure 2: A student's post-intervention drawing and explanation



The student explained:

"I drew Habesor steam, where there are ducks and turtles. In our wadi (stream) there are no turtles. We went to the Habesor Wadi and I had a great trip. Before the project I thought all the streams were dirty, every time I think of a stream I am reminded of waste. Today I think there are dirty streams and there are clean streams. I feel that our wadi will be clean, and will not be dirty and will not cause disease. I imagine that it is clean and the people do not throw rubbish in it away or burn. If it was clean I would love it, because animals would come and eat from it and drink from it..."

The adults pointed out that in the past the place was clean and healthy, while now it is damaged and polluted. As a result, the students' interviews emphasized the changes to the local environment, describing the stream and the wealth of flora and fauna that used to live around it but no longer do. For example, "When the stream wasn't dirty like today, it was clean and you could drink from it. Animals came there, like the desert fox, wolves, turtles, starlings. All these animals disappeared because people polluted the stream and they stopped coming." The discussions with their elders also

introduced the students to indigenous knowledge from their own culture. Their knowledge included a range of scientifically valuable environmental practices Bedouin society developed as traditions, based on an in-depth everyday experience with the natural environment in which the Bedouins live. One student described, for instance, "... they would put a piece of fabric to strain the [rain]water, and the clean water went down into the well, they dug the well in a low place and directed the water through a ditch like a track so the water would go into the well." Like the visits to the nature reserves, these experiences encouraged the students to imagine the possibility that Hebron Stream could be a positive part of their sense of place:

I imagined the stream in the past, imagined that it was clean and there were tents near it, and no-one dumped trash there at all ... there were also plants near the stream like germander and mayweed ... I hope these plants come back because they are medicines for people. They took everything from nature, there was no market or factories, and that's good for the environment and doesn't harm it.

One important component that arose from both the pre- and post-sets of student interviews is their awareness of the relationship between the stream, the community, and the political-economic situation. Because the village had no access to organized waste disposal, for example, residents habitually resorted either to burning their garbage or to throwing it in the stream, actions that became accepted norms in the village. A substantial number of the students' pre-interviews (45%) reflect their awareness of this, in statements like, "Where would they put the garbage, near the house?! Where can they go with the garbage, that's why they dump it in the stream." We also noted this practical constraint in the post-interviews, with some students noting, "We still burn; we don't have a bin. We asked but they didn't bring one. It's not good to burn, it pollutes the air, but where should we put the garbage?"

As this quotation illustrates, the students' post-interviews included explicit reflection on flaws in the progress of the regularization process (for example, delays in providing families with bins, or in emptying those provided, disappointment that, though the banks were cleaner, the water in the stream was still not fit to drink). However, the interviews also expressed a newfound optimism regarding the improvement in the stream's conditions that contrasted sharply with their earlier fatalistic attitudes. In the pre-program interviews, many of the students (59%) expressed feelings of anger and hopelessness towards the stream, making negative predictions about its future. For example, "The stream won't change. If now no-one does anything ... in the future, they will?! It will be even more dirty... people multiply, and they'll dump more garbage." In contrast, nearly all of their post-program interviews (96%) expressed greater optimism and the hope the situation will improve. For example,

In the past I thought the stream was dirty because people threw garbage in it. And today there isn't a lot of garbage in the stream. I thought the stream would not change and would get worse. Today I think it will improve and people won't dump garbage in it.

Importantly, the program also encouraged the students to think reflectively about their own behaviour and that of their community. Learning about the significance of the

stream as an ecosystem and about the environmental impact of their current waste management practices prompted the students to look more critically at behaviours they previously took for granted. One student said, for instance, “It was normal for me that we dump garbage in the stream... From the project I understood that the stream is important and if it’s dirty that harms us... we have to protect the stream.” Another said, “I didn’t think of it before, we need to look after the stream, and not burn. They will bring us trash bins. I didn’t think that we were polluting the environment.” The intergenerational conversations also encouraged such reflective thinking by emphasizing the relationship between the community’s behaviour and the changes that have occurred in their environment. As one student explained,

Today they open the pipe for the whole day and waste a lot of water. They used to take one bucket, not waste the water. From the animal droppings, they lit the fire, took advantage of the droppings and did not leave them. It’s good that they used the droppings, they didn’t cut down trees to light the fire.

As another student noted, “The stream helped us, we drank from it, and we need to protect it because we need it... It does us good, and if we keep polluting it, we won’t be able to drink from it.”

One goal of the intervention was to develop the students’ sense that they were capable of creating change in their own community, and the program incorporated several activities that addressed ways of expanding the circle of people involved in the protection of the stream. However, while 35% of the students’ interviews after the first two years reflected their *desire* to take action, references to taking *actual* action to change the behaviour of others were notably absent. The interviews did, however, include several references to the difficulty of taking such action. One student said, “I learned that if my friend litters I should tell her not to. We were in the field and I told her not to litter and she laughed at me and said, ‘there’s lots of garbage here’.” Another told us she anticipated a similar reaction if she tried to talk to others about their behaviour, claiming that, “when we tell our cousins and our neighbours [not to litter] they will laugh at us.”

In response to these results, the third year of the program introduced structured activities designed to help the students take action to promote environmental behaviour in their community. The interviews we conducted after the intergenerational information tour at the students’ school reflected its contribution to the students’ sense of empowerment and self-efficacy. The students reported feeling their fellow students respected them and feeling proud of their participation in the project – not just as learners, but as *active participants*. The students felt more confident about taking part in social interactions that promote environmental issues, and influential in passing on messages and encouraging other children to engage in environmental activity. As one student said, “I felt that they really understood me and did what I asked. I felt happy, because I was explaining to them and that could bring an end to the pollution that’s in the stream, because I’m influencing them, and they’ll tell their parents.” The mothers also raised this change in their interviews about the program’s influence. One mother expressed the opinion that the program “builds character,” adding that “regular learning doesn’t teach and build character.” Another mother said, “my son is more social after the project. I didn’t expect it. I was surprised... The project increased the child’s self-confidence.”

19.8 Discussion

All over the world, indigenous societies are living in close contact with Western society, and often in a state of ‘transition’ due to its influence. Our study highlights the importance of developing tools that examine these communities’ relationships with the places where they live, and of designing programs that take the complexities of these relationships into account, thereby addressing each community’s particular social, cultural, and environmental needs. In this chapter, we demonstrated how to leverage productively the combination of place-based education and third-space theory in various ways to manage the problems – and take advantage of the opportunities – inherent in working with students from indigenous backgrounds. The diversity and specificity of the students’ experiences of their ‘place’ required us to gather a great deal of specific information to design an appropriate place-based education program. The third space thus became a critical site in which to ‘negotiate’ the form and content of the tool with which we learned about these students’ particular ways of life. Based on this detailed information, we created a program we specifically tailored to the lives of these students and to the particular environmental challenges they face. We found after the program, the students were more likely to view their local stream as part of their village. They were also more aware of the stream’s importance as a natural resource and of the relationship between the stream, the community, and the political-economic situation.

Place-based education is built upon the idea of forging connections between learners and the places in which they live by giving learners opportunities to have experiences in their local environments (Sobel, 2004; Herman et al., 2020). However, the environment in which these students live is highly contaminated, which severely limited the types of positive learning experiences it could provide. We therefore incorporated additional experiences through visits to healthy natural environments, which served as ‘surrogates’ for Hebron Stream – alternative places where students could experience environments similar to what their own environment could be.

According to Avriel-Avni et al. (2010), learning about a place means changing a learner’s point of view of that place or offering them a new way of experiencing it by, for instance, separating an object from its habitual context and relating it to other contexts. Thus, in this study, we recontextualised Hebron Stream for the students through personal experiences with other, healthy streams. Another, similar form of recontextualisation for the students was their intergenerational encounters with older members of their tribe. Engagement with the community is an important concern of place-based environmental education, since it can help students achieve “understanding through multidisciplinary, experiential, and intergenerational learning that is not only relevant but potentially contributes to the well-being of community life” (Gruenewald, 2008, p. 7). Their dialogue with adults taught the students about the history of their place and elicited comparisons between the state of the stream (and the behavior of its inhabitants) in the past versus the present. This newfound familiarity with the history of their environment and with parallel natural environments seems to have changed the ways the students experienced their current environment, opening their eyes to possibilities they had not entertained before.

The incorporation of both ecological observation field trips to nature reserves *and* intergenerational conversations with local elders indicates the general strategy that defined the program as a whole. As we showed in Figure 2, we designed the program to draw upon both Western and indigenous ‘funds of knowledge’, and then provide a third, ‘hybrid space’ where “everyday resources are integrated with disciplinary learning to construct new texts and new [scientific] literacy practices that merge the different aspects of knowledge and ways of knowing offered in a variety of spaces” (Moje et al., 2004, p. 44). This meant incorporating (a) activities that elicit knowledge based on the students’ own experiences and those of their community, (b) activities that provide access to Western knowledge and experiences, and (c) activities that employ both sources as a foundation for reflection and dialog.

In our program, this dialog focused on three principal goals. First, processing and filtering all the information, experiences, and insights we collected throughout the program. One such processing activity was creating an ‘ID card’ for Hebron Stream using information drawn from personal familiarity with the students’ home environment, knowledge gained from intergenerational encounters about their community’s use of the stream in the past, and scientific concepts about the stream as part of the ecosystem based on conducting scientific observations. During this processing, the students employed a combination of scientific terms for the stream as a healthy system and their own community’s terminology for local phenomena using their own local dialect.

The second goal was to engage in dialog about dilemmas or areas of discomfort illuminated by the combination of students’ personal experience and the knowledge they were gaining in the program. For example, the students discussed environmental social dilemmas in the context of animals they had seen harmed by exposure to waste and pollutants, informed by new knowledge about the importance of biodiversity. In discussing possibilities for the future of the stream, the students engaged in a prolonged discussion of the relative benefits of maintaining it as a natural place versus a more ‘artificial’ environment.

The third goal was to engage the students in critical reflection, encouraging them to re-examine their underlying assumptions regarding various aspects of their current relationship with their place. This means, for example, recognizing the connection between consumption practices and waste management practices, and the implications of the waste management methods their village currently employed. The students also engaged in critical reflection on the rehabilitation process, addressing the practical limitations of the rehabilitation so far.

In conclusion, our study reveals the conceptual benefits of employing both place-based education and third-space theory as ways of understanding how people, in this case young Bedouin students, relate to their local environments. It also shows how using an approach that drew on place-based education and third-space theory led both to the development of a culturally sensitive research instrument and to an educational program that helped these young Bedouin students gain a greater sense of ownership over their environment and a more optimistic vision of its future.

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