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Examining Urban, American, Middle-School Students' Divergent Views of Nature Before and After a Field Trip to a University Field Station and Nature Preserve

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Abstract
Nature field trips offer opportunities for urban students' exploration, discovery, and learning which they may not experience otherwise. Seventh grade students at an economically disadvantaged urban school in the US Midwest sorted statements related to school, nature, and science before and after their field trip experience. These sorts provide a snapshot of students' subjective thoughts on the topic. The statements were developed from student writings from the previous year's 7th grade field trip. As a qualitatively focused mixed method, Q methodology [Q] requires only a relatively small group of participants (here just under 50). The sorts were then statistically grouped based on similarity of the sorts with the resulting three perspectives: *Active Nature Learners*, *Not a Nature Lover*, and *The Environmentalists*. Thus, Q provided differentiation of student views about nature before and after the field trip. Thirty-percent of those who provided sorts before and after the field trip changed their viewpoint to one that was more positive about nature (*Active Nature Learners*) or the environment (*The Environmentalists*). Students' written comments and the descriptive viewpoints stakeholder feedback that can be used for program improvement. For instance, *The Environmentalists* view provides an outcome goal for the field trip experience for students.

Keywords Field trips · Q methodology · Urban youth · Nature · Urban school · Informal science education

As part of a nationally funded grant, urban American middle-school students were exposed to nature via a field trip to a university field station and local nature

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preserve. To assess changes in student views about nature, the researcher collected data before and after the field trip. The assumption was that not all students would be affected by the field trip experience in the same way. Therefore, the researcher used Q methodology which allows for the determination and description of divergent viewpoints concerning a topic.

Introduction to the Problem

Urbanization of industrial nations, like the U.S., negatively affects their population's ability to come into direct, purposeful contact with nature. These urban population's contact with nature are driven by both opportunity and inclination. Thus, it is not surprising that direct contact with nature, especially intentional such as visits to public parks, is rare for urban dwellers (Cox et al. 2017). Yet interactions with nature have been shown to improve science literacy and attitudes toward biodiversity (Sousa et al. 2016) as well as providing physical and mental health benefits (Cox et al. 2017; Tardona et al. 2014). Field trips offer opportunities for student exploration, discovery, first-hand and original experiences (DeWitt and Storksdieck 2008).

Much of the informal science and field trip literature involves science knowledge in presentations of aggregate quantitative data such as Leonard et al. (2016). That study targeted increasing science content knowledge among underrepresented minority students and enhancing their interest in science. Interest in science was measured qualitatively yet in aggregate such that differentiation of views was not a goal of the study. Similarly, Lin and Schunn (2016) investigated attitudes and abilities in science of a large sample of 6th and 8th grade students related to informal science experiences. Attitudes were measured using multiple Likert-scale surveys and the results were further analyzed via regression analysis. Although differences were revealed among 6th grade versus 8th grade students, this study did not target differentiating viewpoints. In addition, the results of the Likert-scale surveys were provided as aggregate scores. However, the calculation of mean scores assumes a Gaussian distribution of responses (Newman and Newman 1994) which may not be the case. In other words, the frequency of responses may be skewed or even bimodal or another non-Gaussian distribution (Ramlo 2017). Additionally, Brown (1980) explained that responses to Likert-scale type items are not standardized. In other words, one subject's response may differ in meaning as determined by the observer or anyone else. Furthermore, Likert scale surveys often offer choices that fit within predetermined researcher views/frameworks (Hilton et al. 2009). Finally, Liker-scale surveys cannot reveal the complexity of the opinions within a group like Q methodology (McKeown 2001). Yet Likert-scale surveys and observations appear common in determining student attitudes related to science and/or nature.

For instance, Tardona et al. (2014) brought schoolchildren from disadvantaged urban public schools to a nearby Ecological and Historic Preserve and found that engagement with nature can positively influence education related to nature, history, and health for urban schoolchildren. Yet their study was based upon observations of students. Cox et al. (2017) used quantitative analyses of self-reported information related to contact with nature. Similarly, the study by Sousa et al. (2016)

investigated student perspectives (attitudes) about biodiversity using a Likert-scale survey which did not allow the determining and description of multiple, divergent perspectives. Lawless and Brown (2015) used anonymous written communication by students to investigate students' interest in STEM careers, future science explorations, and self-efficacy about writing. Elmesky and Tobin (2005) involved urban students as researchers including ethnographers about their own nature exposure within their neighborhoods and experiences. Their study involved student interviews and the involvement of students as participatory researchers and ethnographers.

Certainly, the informal science research literature is rather voluminous. Targeting middle school students in poor urban areas certainly reduces the number and types of studies related to informal science. Much of the literature focuses on science learning rather than student attitudes. Those studies that target student attitudes depend upon Likert-scale surveys, observations, or student writing. Yet each of these types of investigations concerning student views of nature only present findings in aggregate often with means of Likert-scale rankings where the distribution is unlikely to be Gaussian (Ramlo 2017). Moreover, it does not seem likely that all or even most students will have the same reaction to exposure to nature whether in an informal science setting or another type of setting. Thus, this study is unique in that it used Q methodology to investigate students' divergent views of nature and science before and after the grant supported field trip to a local wetland and nature center. Q methodology does not assume uniformity of responses by participants; alternatively, Q methodology allows for the differentiation of viewpoints about an experience or topic. Like the studies by Sousa et al. (2016) and Tardona et al. (2014), this study also involves schoolchildren from a disadvantaged, urban public-school system. However, by using Q methodology, this study reveals the differing viewpoints of disadvantaged, urban public-school students regarding nature before and after their field trip. Consequently, the use of Q methodology provided differentiation of the field trip experience and its effect on these students' views of nature.

The Urban School

The urban school is located within a medium sized city in the US Midwest. The single-building school contains grades 7–12 and is designed as a Community Learning Center (CLC). The school enrollment is about 824 students. The demographic breakdown is 93.7% black, 2.9% multiracial, and 2.6% white. The student population is 100% economically disadvantaged, with a 23.6% disability rate. The school's attendance rate is 93.4% with a 19.6% chronic absenteeism rate as well. The school formed in 2012 as a combination of a former high school and middle school. Since its inception, the CLC adopted a New Tech model of teaching which emphasizes Project Based Learning (PBL) with students.

University Field Station

The University Field Station was created 20 years ago as a collaboration between the university and a nearby township at a nature preserve. The Nature Preserve and

University Field Station consist of approximately 411 acres. The University Field Station promotes understanding and research of Ohio's wetland environments via a living laboratory design. The goals of the University Field Station are: (1) to provide a center for long-term environmental research emphasizing habitat restoration and terrestrial ecology, (2) to support the education programs of primarily urban universities and local schools, and (3) to interact with the local community in promoting environmental awareness. Among the largest terrestrial ecology field stations in Ohio, this University Field Station collaborates with other field stations and environmental education facilities in the region. Various departments at the University use the University Field Station for research and teaching. The University Field Station and the Urban Middle School in this study first partnered to bring students to the Field Station several years ago, prior to this study.

Field Trip

The seventh-grader participants, aged 12–13 years old, rotated through five nature exploration stations. The following provide a summary of these stations: (1) looking for algae and microorganisms in water from the Nature Center Pond with compound microscopes inside the field station; (2) creating insect-inspired art in an outdoor shelter; (3) playing an outside game of tag to learn about water quality and macroinvertebrates; (4) going on a nature hike through the Nature Preserve; and (5) exploring the garden bowl wetland with boots and binoculars. These students spent about 35 min at each of these stations. Highlights included seeing turtles and ducks as well as lots of mud.

Program Assessment

Previous and current National Science Foundation funding has provided the means of bringing students from the Urban Middle School to the University Field Station over several years. Within the current grant cycle, the program assessment model is based on McNeil et al. (2005) who stress program assessment is a key ingredient to program health and the program's abilities to meet the needs of stakeholders including students. Additionally, McNeil et al. (2005) contend that assessments and evaluations must consider that different stakeholders may be affected differently by a program. Thus, classifying students into different viewpoints regarding nature and learning will be helpful within this program assessment. Differentiating viewpoints and drawing on consensus among those viewpoints will allow for informed decision making and improve investigation of the program's capabilities to meet the needs of these urban students. In other words, the program assessment aims to create improved partnership and student experience by examining the divergent student viewpoints about nature and science before and after their field trip and problem-based learning (PBL) experience using Q methodology. This assessment fits within the suggested assessment framework of DeWitt and Storksdieck (2008) to better involve stakeholders in the assessment process, to provide means to establish the value of field trip experiences, and to differentiate the effectiveness of the experience

among participants. Q methodology provides the ability to differentiate program effectiveness among stakeholders (Ramlo 2015b) by determining and describing the various viewpoints about a topic (Brown 1980; McKeown and Thomas 2013; Newman and Ramlo 2010).

Q for Program Assessment

With the ability to differentiate stakeholder viewpoints about a topic or situation, it is not surprising that Q methodology has been used for program assessment. For instance, Chamberlain et al. (2012) used Q to inform existing conservation efforts related to grizzly bears in several areas in Canada. By purposefully selecting 29 stakeholders, these researchers were able to determine divergent perspectives about these conservation efforts and then, in turn, offer workshops aimed at informing stakeholders and developing agreed upon management strategies.

Within the field of medical education, Gingerich et al. (2017) used Q to investigate issues related to inter-rater reliability estimates of medical doctor interactions with patients. Although a standardized rating rubric was used to score these clinical evaluations, inter-rater variation was prevalent. This was the case even when multiple observers provided ratings of the same clinical performance. Using Q, evaluators provided their assessment impressions by sorting statements into a grid that ranged from 'most consistent with my impression' to 'most contrary to my impression.' The factor results, in conjunction with the evaluation scores of the performances, indicated that there were multiple interpretations of clinical performances. These interpretations dispel the presupposition of homogeneity of responses for clinical assessments. This is a very big problem that indicates that evaluators are not interchangeable and that multiple ratings cannot be easily reconciled into a single judgment. Thus, this initial study indicates that the current clinical-performance measurement models are inefficient in extracting and summarizing the relevant assessment information. These measurement models may need to be adapted in a way that considers the salient aspects of evaluator impressions related to clinical performance.

Method

Q methodology [Q] is used to scientifically study subjectivity through the differentiation and description of viewpoints among a group about a topic. Thus, the selection of Q methodology is appropriate whenever viewpoints are to be investigated in a way that does not simply target the discovery of average responses, whether that is a mean response on a Likert-scale item(s) or a theme analysis from interviews. The applications of Q are broad and include studies within numerous disciplines including political science, journalism, marketing, environmental studies, health policy studies, and education (Brown 1980; McKeown and Thomas 2013; Newman and Ramlo 2010; Ramlo 2016).

Over 80 years-old yet identified as a mixed method (Newman and Ramlo 2010; Ramlo 2015a, 2016), Q consists of a series of qualitative and quantitative interwoven stages (Ramlo 2015a) each with a qualitative focus including within the factor analytic stage (Ramlo 2015a, 2016). It is incorrect to state that Q is simply an inverted R matrix (McKeown and Thomas 2013). Additionally, researchers often associate the sorting of statements into a grid (Q technique) and the factor analysis of people (Q method) with Q methodology. However, Q consists of a complete methodology including a series of stages as well as a set of philosophy of science, epistemological, ontological, and statistical principles (Brown 1980; Ramlo 2015a, b, 2016). Q studies commence with the generation of a concourse of items (most typically statements) that represent the broad communications on the subject. Next, the researcher selects the Q-sample that is a subset of the concourse that captures the range of communications. The study's participants sort the Q-sample items into a grid based on their viewpoint such that there are no right or wrong answers. The sort provides a snapshot of each participant's view on the topic. These sorts are then analyzed via factor analysis and correlation such that similar views are grouped together to represent unique, divergent viewpoints. Tables of data that include factor arrays (theoretical sorts for each factor) and distinguishing statements in conjunction with post-sort interviews or written comments provide the means of interpreting each factor (viewpoint) that emerged from the analyses (Gingerich et al. 2017; McKeown and Thomas 2013; Newman and Ramlo 2010; Ramlo 2015a, b).

Concourse and Q-Sample

For this study, the concourse of statements came from previous data collected from seventh grade students at the Urban Middle School a year prior to this study. This information was collected before and after that year's field trip to the University Field Station and consisted of students' written comments, survey responses, and essays. One-hundred-eighty-six statements made up the concourse across four themes: active, good student (characteristics), learning, and nature.

Experimental design procedures were used to select a Q sample theoretically from the concourse using Fisher's experimental design principles as suggested by Brown (1980). The goal was to have a Q sample with 30–60 items that were as representative of the concourse (with items selected across each of the four themes). The final Q-sample for this study contained 40 statements which were then offered to participants on individual slips of paper for sorting.

Q-Sorts and P-Set

Like the field trip, participants in the study had to provide parental-approval to participate in the study as well as offering their own consent at the time of the sorting. Because some of the older students had participated in field trips to the University Field Station in previous years, this study involved only seventh-grade students. In this way, the students would have not been involved in any previous version of this partnership between the school and the university.

The participating students (P-set) remained in their classrooms to perform the sort while the non-participating students went to the library. Participating students received an envelope with the 40 statements, each with an identifying number, instructions, and the sorting grid, shown in Fig. 1. The condition of instruction provided was that the students should sort the statements into the grid based upon their view. Students provided Q-sorts prior to the field trip (pre) and after the field trip (post). Students sorted on the Wednesday before the Friday field trip and then the Wednesday after they sorted again. After completing the sorts, the students answered three questions—two related to their reasons for placing the statements at the two ends of the grid (+4 and −4) and one regarding their thoughts about the sorting process or any other comments they would like to make. In total, 46 students provided usable Q-sorts before the field trip and 48 students provided usable Q-sorts after the field trip. Some sorts had to be discarded because they were incomplete. Although this may seem like a small sample, the sample size in Q is the number of statements (thus the term Q-sample) rather than the number of participants (Brown 1980; McKeown and Thomas 2013). Alternatively, the number of participants, P-set, is theoretically relevant to the problem under investigation (Brown 1980). Q studies may involve one person sorting under multiple conditions of instruction or a relatively small group of participants, usually less than 40 (Brown 2008).

Analyses

The researcher entered student sorts into specialized software for Q methodology. This software, PQMethod, provides not only the means to group similar sorts (by

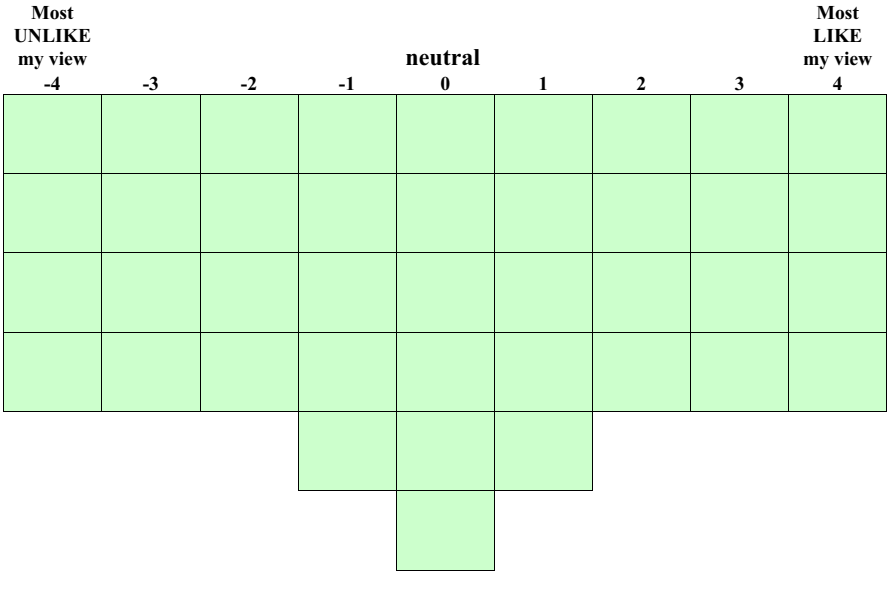

Fig. 1 Sorting grid used in this study

person factor analysis) but also provides detailed tables used for interpretation of each factor (viewpoint) (Newman and Ramlo 2010). This is not R factor analysis which groups items. Instead, Q groups people such that each factor represents a distinct, divergent viewpoint (Brown 1980; McKeown and Thomas 2013). When a sort has sufficient correlation with a factor/viewpoint with minimal correlation with the other factors/viewpoints, the sort is represented by that factor using "flagging" within the Q software. Only sorts flagged on a factor are used to create the descriptive tables for those factors. These tables consist of salient and distinguishing Q-sample statements (or other types of items) and consensus items. Interpretations of viewpoints also include the post-sort comments provided by the participants (Brown 1980; McKeown and Thomas 2013; Newman and Ramlo 2010) whether those are collected via participant writings or interviews.

Results and Discussion

For this study, two factors emerged from the analyses. The second factor was bipolar meaning it contained sorters with positive correlation and negative correlation with the factor (e.g. opposite poles). Brown (1980) stresses that bipolar factors are best split into separate factors, each representing one of the two opposing poles. This method is preferred rather than reporting on only the results of those with positive factor correlations and assuming that the negative end merely is the reflection of the positive end. Thus, this study truly contains three factors where the second original bipolar factor was split into Factor 2 and Factor 3. The researcher inverted Factor 3 (multiply by -1) and selected only those positively correlated sorts as representing this viewpoint. Factor 2 then only included those with positive correlations with that viewpoint. Separating a bipolar factor in this way assists in the interpretation phase. Additionally, as Brown (1980) suggests, Factors 2 and 3 are not simply opposites but are worthy of separate interpretations.

Distribution of Sorters on Factors

Although the interpretations of the factors follow, it is interesting to consider the distribution of participants across the three factors prior to the field trip and afterwards. The factor matrix for the sorts is provided in Table 1 where sorts identified by a factor are indicated with an X. Not all students who successfully completed the pre-sort also successfully completed the post-sort. In fact, 11 students at the pre-sort and 4 at the post-sort failed to successfully provide a coherent sort of the statements. Those sorts were discarded. However, the researcher entered the 48 completed pre-sorts (prior to the field trip) and 46 completed post-sorts (following the field trip) into PQMethod. Forty-three (43) students performed both the pre-sort and the post-sort. This is a sufficient number of participants for a Q study, as previously discussed.

Examining the 43 students who performed both the pre and post-sorts, 13 (30%) changed their viewpoints (identified by a shift in factor association or loss of factor association). Most of those students changed from Factor 2 at the pre-sort to

Table 1 Factor matrix for all sorts

Sort #	Q sort—pre	F1	F2	F3	Sort #	Q sort—post	F1	F2	F3
1	1	X			49	1A	X		
2	2				–	–			
3	3	X			50	3A	X		
4	4	X			51	4A	X		
5	5	X			52	5A	X		
6	6		X		–	–			
7	7	X			53	7A			
8	8	X			54	8A	X		
9	9	X			55	9A	X		
10	10		X		56	10A			
11	11	X			57	11A		X	
12	12		X		58	12A	X		
13	13		X		59	13A		X	
14	14	X			60	14A	X		
15	15				61	15A			X
16	16				62	16A			
17	17	X			63	17A	X		
18	18	X			64	18A	X		
19	19	X			65	19A	X		
20	20	X			66	20A	X		
21	21	X			67	21A	X		
22	22	X			68	22A	X		
23	23	X			69	23A	X		
24	24				70	24A			
25	25				71	25A			
26	26	X			72	26A	X		
27	27		X		73	27A	X		
28	28			X	74	28A			
29	29		X		75	29A	X		
30	30	X			76	30A			X
32	32	X			77	32A	X		
33	33	X			78	33A			
34	34		X		79	34A		X	
35	35	X			80	35A	X		
36	36	X			81	36A	X		
37	37	X			82	37A	X		
38	38	X			83	38A		X	
39	39				84	39A			
40	40				85	40A	X		
41	41		X		86	41A		X	
43	43	X			87	43A	X		
44	44	X			88	44A	X		

Table 1 (continued)

Sort #	Q sort—pre	F1	F2	F3	Sort #	Q sort—post	F1	F2	F3
45	45	X			89	45A	X		
46	46		X		90	46A-no trip		X	
47	47	X			91	47A	X		
48	48	X			–	–			
–	–				92	49A	X		

Sorts represented by a factor are indicated by an X

Factor 1 at the post-sort. At pre-sort, the distribution of sorts across Factors 1, 2, and 3 were 32, 16, and 1, respectively. At post-sort, the distribution of sorts across the three factors were 29, 6, and 2, respectively. Typically, in Q, researchers are not particularly interested in the number of sorts identified on a factor which is directly associated with the variance accounted for by each factor. However, in this study it is at least interesting to note that the distribution changed from prior to the field trip (pre) to after the field trip (post). Yet the 30% change in factor association among those who completed both the pre- and post-sorts is of greater interest because it indicates that the field trip to the nature center and wetlands had an impact on the viewpoints of students who participated. Within Q, however, the focus is on describing the types of divergent viewpoints that exist within a group. The next sections discuss the descriptions and interpretations of each of the three factors that emerged in this study. These interpretations are based upon the factor arrays for each factor including distinguishing and consensus statements. Students' written comments were also used to help better understand each factor (Table 2).

Interpretation: Factor 1: Active Nature Learners

Overall, those on this factor resonate with statements that indicate that they enjoy physical activities, hands-on learning, and outdoor experiences including nature. Those represented by Factor 1 "like to be outside and active" (Statement 17, distinguishing for all three factors with placements at 4, −2, and 0, respectively). These students also believe that they "can learn new things about nature better by being in nature instead of just a classroom" (#35 distinguishing with 3, −1, 0). Exploring nature does not make them nervous (#39 distinguishing with −3, 2, −1) and they enjoy hiking (#29 at −3, 2, −2). They like science (#36 distinguishing with −3, −2, 0). Additionally, Factor 1 represents those who think it "is fun to do project-based learning (PBL) sometimes instead of paper and pencil stuff all the time" (# 31 distinguishing with 3, 0, −3). These students "feel good when I get to learn stuff I did not know" (#11 distinguishing with 3, 0, 1). Those on this factor and Factor 3 enjoy interacting with other students (#33 at −4, 1, −4) which appears connected to their preference for active learning. These students also believe they are both respectful and responsible (#38 distinguishing with −4, −1, 3).

Like Factor 2 but unlike Factor 3, the Factor 1 viewpoint likes "field trips because we aren't at school" (#25 at 4, 4, −1) and get to see new things (#14, at −4, −3, 2).

Table 2 Factor arrays for each of the three factors (viewpoints)

No.	Statement	Grid position F1	Grid position F2	Grid position F3
1	I am not a very good writer	*−2*	1	1
2	I don't have a lot of experience with nature	*−1*	*3*	*0*
3	I want to feel good about my school	2	3	*−4*
4	I want to be a creative problem solver	1	*−3*	3
5	I really don't like doing project-based learning (PBL)	*−1*	*−1*	*3*
6	There aren't a lot of things to do out in nature	−3	*2*	−3
7	I don't really like learning about the history of an area like the wetlands	−2	*0*	−3
8	I feel happy when our school is recognized for doing something good	*2*	*1*	*−4*
9	The wetlands are really nice and peaceful for kids and adults	*2*	*−1*	*4*
10	It makes me feel happy when my friends & I get to support our school	2	1	2
11	I feel good when I get to learn stuff I did not know	*3*	0	1
12	I like to learn about animals	*3*	*4*	*−1*
13	Walking helps me relieve stress	1	0	0
14	I don't like going on trips or seeing new things	*−4*	*−3*	*2*
15	I don't know what I want to learn about	−2	0	−2
16	I am not a good student	−4	−4	−3
17	I like to be outside and active	*4*	*−2*	*0*
18	I feel happy when our school is recognized for doing something good	4	4	*−2*
19	I like learning about trees and other plants	0	*−4*	1
20	Everything in nature is beautiful to me	0	*−3*	0
21	I like to feel like a smart kid	4	4	*−1*
22	I love learning about the environment	*0*	*−4*	*3*
23	I believe it is important to restore the wetlands for future generations	*1*	*−1*	*4*

Table 2 (continued)

No.	Statement	Grid position F1	Grid position F2	Grid position F3
24	It is good to separate myself from using electronics sometimes and get outside	1	*−3*	2
25	I like field trips because we aren't at school	*4*	*4*	*−1*
26	It's important to be engaged in real-world activities when it comes to science	1	*−2*	2
27	I don't feel confident talking about how important the wetlands are to the environment	*−2*	*1*	*4*
28	Project-based learning (PBL) is a good way to get to know people in your class	0	*2*	1
29	I don't really enjoy hiking	−3	*2*	−2
30	All kids should learn about nature	0	0	−1
31	It is fun to do project-based learning (PBL) sometimes instead of paper and pencil stuff all the time	*3*	*0*	*−3*
32	I like learning about different kinds of rocks	*0*	*−4*	*4*
33	I don't enjoy interacting with other students	−4	*1*	−4
34	I don't really know a lot about nature	*−1*	*3*	−2
35	I can learn new things about nature better by being in nature instead of just a classroom	*3*	−1	0
36	I don't like science	*−3*	−2	0
37	I usually don't feel proud of our school	−1	−2	*1*
38	I am not very good at being respectful and responsible	*−4*	*−1*	*3*
39	Exploring the woods makes me nervous	*−3*	*2*	*−1*
40	I do not like learning about insects (bugs)	*−1*	*3*	*−4*

Italics, distinguishing statement for the factor; bold, underlined statement number, consensus statement

They feel happy when their school is recognized for doing something good (#18 at 4, 4, −2). Similarly, those on Factor 1 agree with Factor 2 that they "like to feel like a smart kid" (#21 at 4, 4, −1). They also want to learn about animals like those represented by Factor 2 (#12 at 3, 4, −1).

To help with interpretation, written comments by those represented by this factor were also considered. Those on this view tended to be the most expressive in their comments compared to the other views. Only this view sees themselves good writers (#1 at −2, 1, 1). For instance, participant #44 made written statements before and after the field trip about enjoying science but disliking insects and rocks. However, this participant also wrote that "I learned more about nature on the field trip so I changed my mind a little." Similarly, participant #47 wrote that she enjoys science but not rocks in her pre- and post-sort comments. She also wrote at the post-sort "I never thought playing in mud will be so fun" and that she loved the wetlands. Others on this factor made similar comments. Thus, this factor, with its focus on nature, science, and active learning, was named *Active Nature Learners*.

Interpretation: Factor 2: *Not a Nature Lover*

Although Factor 2 shares some similarities with Factor 1, the Factor 2 view is unique. Salient and distinguishing statements related to this view indicates that these students are focused on their discomfort and inexperience with nature. For instance, a key distinction is that those on Factor 2 have not had much exposure to nature (#2 distinguishing with −1, 3, 0). Perhaps this is why this view does not think there is much to do in nature (#6 distinguishing with −3, 2, −3) and they believe they do not know much about nature (#34 distinguishing with −1, 3, −2). Those on this view also do not like learning about trees and other plants (19 distinguishing with 0, −4, 1), rocks (#32 distinguishing with 0, −4, 4), or insects (#40 distinguishing with −1, 3, −4). This view disagrees that everything in nature is beautiful (#20 distinguishing with 0, −3, 0). Exploring the woods makes those on this view nervous (#39 distinguishing with −3, 2, −1). Those on this view would rather be on their electronics than go outside (#24 distinguishing with 1, −3, 2). Unlike the other two viewpoints, the Factor 2 view is ambivalent about interacting with other students (#33 at −4, 1, −4).

Sorter #34 is represented by this view both before and after the field trip. She wrote that she doesn't like bugs and doesn't like science. Sorter #13 also is represented by Factor 2 both before and after the field trip. She wrote "the wetlands are ok. I don't like nature." Sorter #40 was also on Factor 2 before and after the field trip. She wrote "I just really hate people." Exploring nature makes her nervous because she "could get lost, and die." She likes to work on projects and believes she is an amazing writer who needs a scholarship to get educated because her family does not have money. The sorting process made her think about who she is as a person. These three students also commented that they consider themselves to be smart.

Thus, those on this viewpoint have minimal experience in nature perhaps due to opportunity or lack of interest. Although smart, those on this view would rather work alone. Yet enjoy working on projects. However, these students do not enjoy

nature, have minimal experience in nature, and dislike varying aspects of nature. This viewpoint was named *Not a Nature Lover*.

Interpretation: Factor 3: The Environmentalists

The Factor 3 view offers more than just an interest in nature. Instead, the salient and distinguishing statements from this view offer a perspective that embraces all aspects of the environment including rocks, insects, and wetlands. Unlike the other two factors, the Factor 3 view disagrees that they want to feel good about their school (#3 distinguishing with 2, 3, −4). These are the students who want to be creative problem solvers (#4 distinguishing with 1, −3, 3). Yet these students dislike doing problem-based learning (#5 distinguishing with −1, −1, 3). Unlike the other two viewpoints, the Factor 3 view is ambivalent about learning about animals (#12 at 3, 4, −1) but loves learning about the environment (#22 distinguishing with 0, −4, 3), different types rocks (# 32 distinguishing with 0, −4, 4), and insects (#40 distinguishing with −1, 3, −4). This viewpoint believes that the "wetlands are really nice and peaceful for kids and adults" (#9 distinguishing with 2, −1, 4). Only the Factor 3 view believes it is important to restore the wetlands for future generations (#23 distinguishing at 1, −1, 4) and feels confident talking about how important the wetlands are to the environment (#27 distinguishing with −2, 1, 4). Yet those on this viewpoint are ambivalent about feeling like they are smart (#21 at 4, 4, −1). The written comments for this factor are not informative. For instance, sorter #61 (15 post-sort) simply wrote "I like doing those things best" for her +4 statements and "I don't really like that" for her −4 statements. However, it is still clear that those on this viewpoint are focused on the environmental impact of the wetlands. Therefore, this viewpoint was named *The Environmentalists*. Note that this is not the opposite of Factor 2 even though this factor is a "split" of the original bipolar factor.

Consensus

Only three (3) of the 40 statements are consensus statements. Across the three factors, these students believe they are good students (#16 at −4, −4, −3). These students are somewhat ambivalent or unsure that project-based learning (PBL) is a good way to get to know people in your class (#28 at 0, 2, 1). Those across these factors are also unsure that "all kids should learn about nature (#30 at 0, 0, −1). Perhaps they appreciate the diversity of thought about nature within their school and even beyond. Certainly, the diversity of perspectives is represented in the factor results and descriptions including the *Not a Nature Lover* perspective.

Conclusions

As McNeil et al. (2005) contend, this study revealed that different stakeholders were affected differently by this Field Trip program. Thus, classifying students into different viewpoints regarding nature and learning is beneficial within this program

assessment. Although it is noteworthy that 30% of those who provided sorts before and after the field trip changed their viewpoint about school, nature, and/or science, the need for program improvements are indicated. The three factors that emerged from the analyses were: *Active Nature Learners*, *Not a Nature Lover*, and *The Environmentalists*. Some students were apprehensive about experiencing nature even after the field trip experience. Understanding that these students do not enjoy interacting with their peers may help the organizers develop different activities with this viewpoint in mind. Certainly, the current activities seem the most impactful for those represented by the Factor 1 *Active Nature Learners* viewpoint. Lastly, *The Environmentalists* represent the one viewpoint that embraces the environmental impact of the wetlands and, therefore, one of the primary goals of the grant's field trip experience. How to help more students become "environmentalists" should be explored as part of the project's future research. Engaging students within research at the University Field Station or, like Elmesky and Tobin (2005), as ethnographers within their own urban environment may be options for future research and grant applications.

Within future research of this field trip experience, stakeholders will continue to be part of the assessment framework as will the differentiation of the effectiveness of the experience among participants. It is hoped that differentiating the effect of the field trip experience on urban students will help further discussions to link scholarship and practice among researchers and educators. Finally, this study further reveals the strengths of Q methodology over other methods such as Likert-scale types of surveys in differentiating and describing viewpoints. Without Q, the study would not have been able to differentiate and describe *The Environmentalists* view. Additionally, without Q, creating a plan to assist those that are *Not a Nature Lover* to an *Environmentalist* or *Active Nature Learner* view would not be possible. Thus, differentiation of these student viewpoints provides valuable information for program improvement related to these field trips for these and other urban students.

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