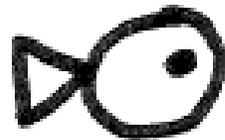
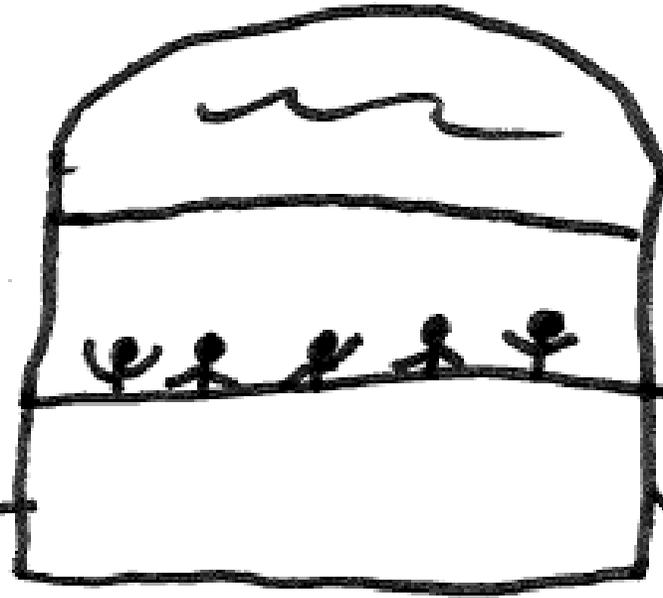


Children's Experience of Nature Through Maps



The Meadows Center for
Water and the Environment
Texas State University

TEXAS  STATE
GEOGRAPHY



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Introduction

- Ways in which children come to understand and interact with nature
(Ramsay et al 2017; Veitch 2016; Aaron and Witt 2011; Payne et al 1998; Wals 1994)
- Children's geographic knowledge and cartographic skills
(Curtis et al 2012; Michaelidou, Filippakopoulou, and Nakos 2007; Berk 2007)
- Children's relationship with nature / children-nature disconnect
(Veitch 2016; Kalvaitis and Monhardt 2012; Loukaitou-Sideris and Sideris 2009; Louv 2008)

Literature Review

- Children-Nature Relationship
 - limited exposure to nature (Louv 2008, Driessnack 2009)
 - diverse (Kalvaitis and Monhardt 2012)
 - mental and physical health and ecological consciousness (Van den Berg et al 2016; Chawla et al 2014; Louv 2011)
- Children Perception of Nature
 - nearby environments (Kalvaitis and Monhardt 2012; Wals 1994)
 - nature as separated from human's world (Payne 2014)
- Children Cartographic Skills
 - use logic (7-11 years old) (Berk, 2007)
 - accurate maps (Michaelidou, Filippakopoulou, and Nakos, 2007)

Purpose

The purpose of this study was to examine K-12 school children's expressions of nature through map-making following a field trip learning experience.

Research Questions

How do children represent their experiences following their field trip?

Q1: What are the most common natural and anthropogenic elements in children's maps?

Q2: What cartographic features do children use in their maps?

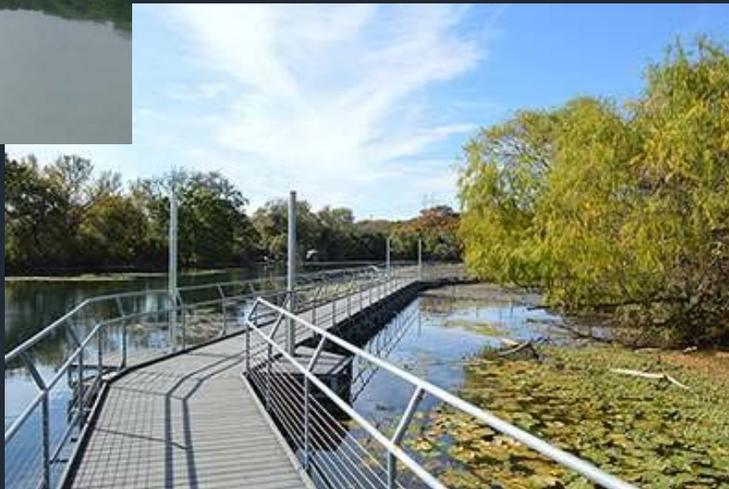
Q3: What are the qualitative differences in the ways children described their maps?

Research Methods

- A phenomenographic framework
 - Phenomenography is a qualitative research methodology, within the interpretive paradigm, that aims to explore the different experiences and perceptions of a phenomenon (Marton, 1986; Bowden and Green, 2005).
- Data collection methods: 1) sketch maps 2) written descriptions.
 - This combination is similar to the “draw and write” technique, which is recognized to be a ‘bottom-up’ approach that allows collection of high quality data from children (Kalvaitis and Monhardt, 2012; Pridmore and Bendelow, 1995).
- A mixed-methods approach
- Pilot study

Participants

K-12 school children participating in a field trip at the Meadows Center for Water and the Environment at Texas State University in San Marcos.



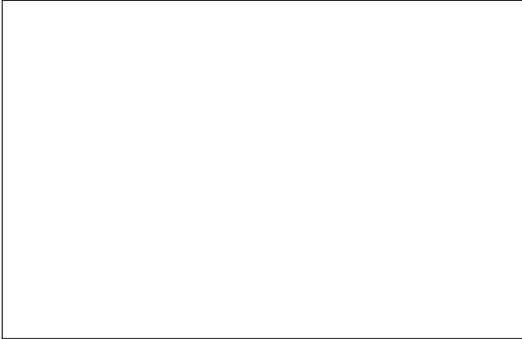
Grade level of Student Participants	765
Elementary School (1-2)	80
Girl Scouts (1-8)	15
Home School (3-8)	68
Middle School (5-8)	687

Geography of Student Participants	765
Weslaco	72
Comfort	166
Roskany	16
Home School	68
San Antonio	443

Front 8.5x11

Teacher Name _____
School Name _____

Draw a map of your field trip today



Back 8.5x11

Explain what you included in your map



Data Collection Instrument

- draw and write technique
- Training and Collection Protocol
- Draw a map of your field trip
- Write a description of your map



Data Analysis

Data:

- A total of 765 maps
- 7/5/2017 to 12/15/2017

Analysis:

- Visual content analysis (Rose, 2016)
- Frequency analysis and chi-square statistical test of goodness-of-fit ($\alpha = 0.05$)
- Content analysis of written descriptions
- SPSS V.25
- NVivo V.12

**Natural
Environment**

**Built
Environment**

People

**Cartographic
Convention**

Text

**Chronological
Setting**

Perspective

Color

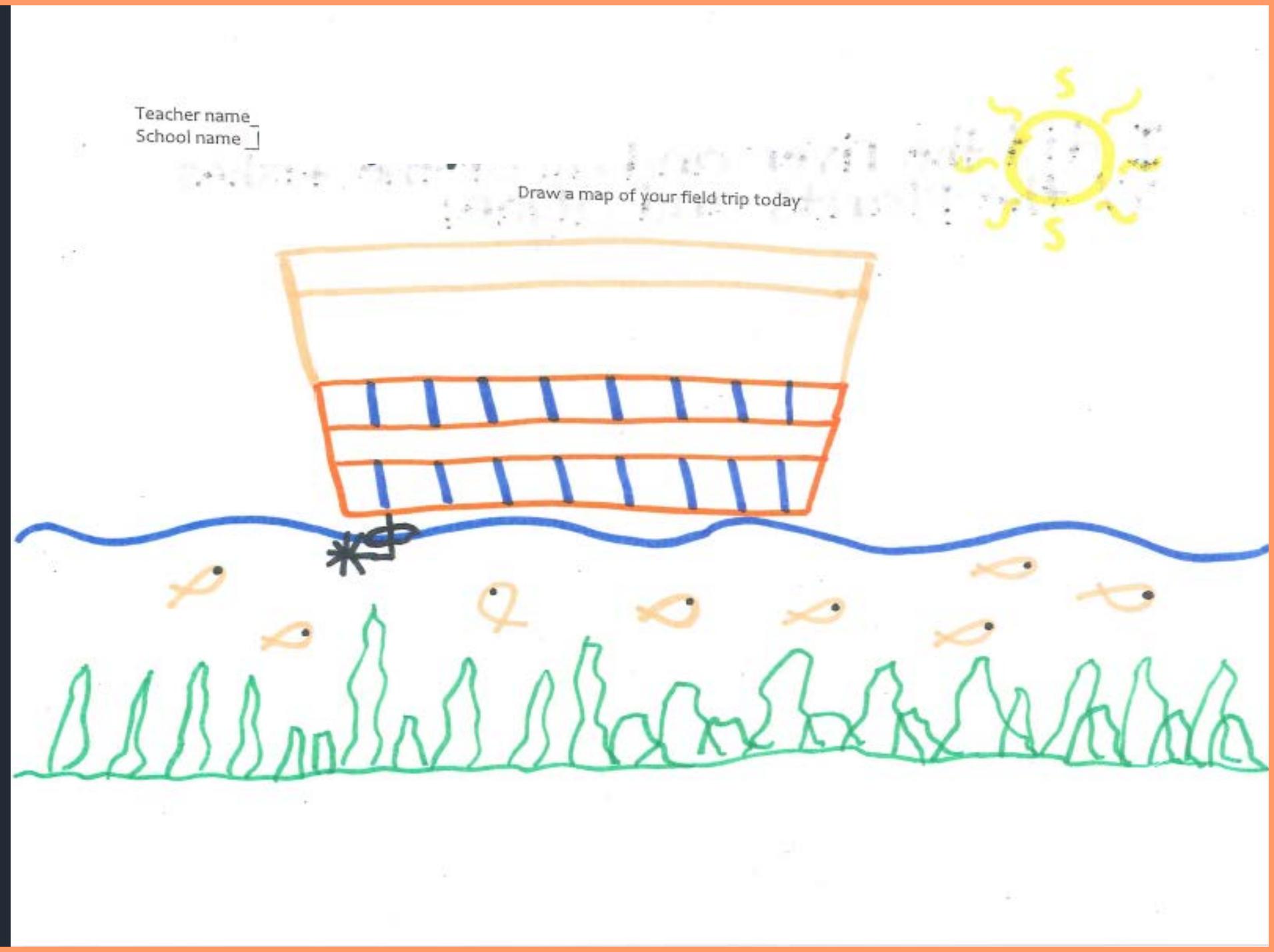
Results: Coding Map Contents

Results: Frequencies and Elements

Natural Environment	N	%
Non-human living		
Flora <i>Chi Square = 2.31 (P = 0.128)</i>	402	52.8%
Fauna <i>Chi Square = 99.9 (P = 0.000)</i>	243	31.9%
Non-living elements		
Sun <i>Chi Square = 599.7 (P = 0.000)</i>	43	5.6%
Other sky elements <i>Chi Square = 691.7 (P = 0.000)</i>	18	2.4%
Water <i>Chi Square = 472.4 (P = 0.000)</i>	681	89.4%

Built Environment	N	%
Boats <i>Chi Square = 46.3 (P = 0.000)</i>	475	62.3%
Trails <i>Chi Square = 51.4 (P = 0.000)</i>	480	63.0%
Buildings <i>Chi Square = 185.5 (P = 0.000)</i>	569	74.7%
Roads <i>Chi Square = 292.3 (P = 0.000)</i>	145	19.0%
Vehicles <i>Chi Square = 365.8 (P = 0.000)</i>	117	15.4%
People <i>Chi Square = 435.4 (P = 0.000)</i>	93	12.2%

Example
of maps
(Natural
Environment)



Example of maps (Built Environment)

Teacher name _____
School name _____

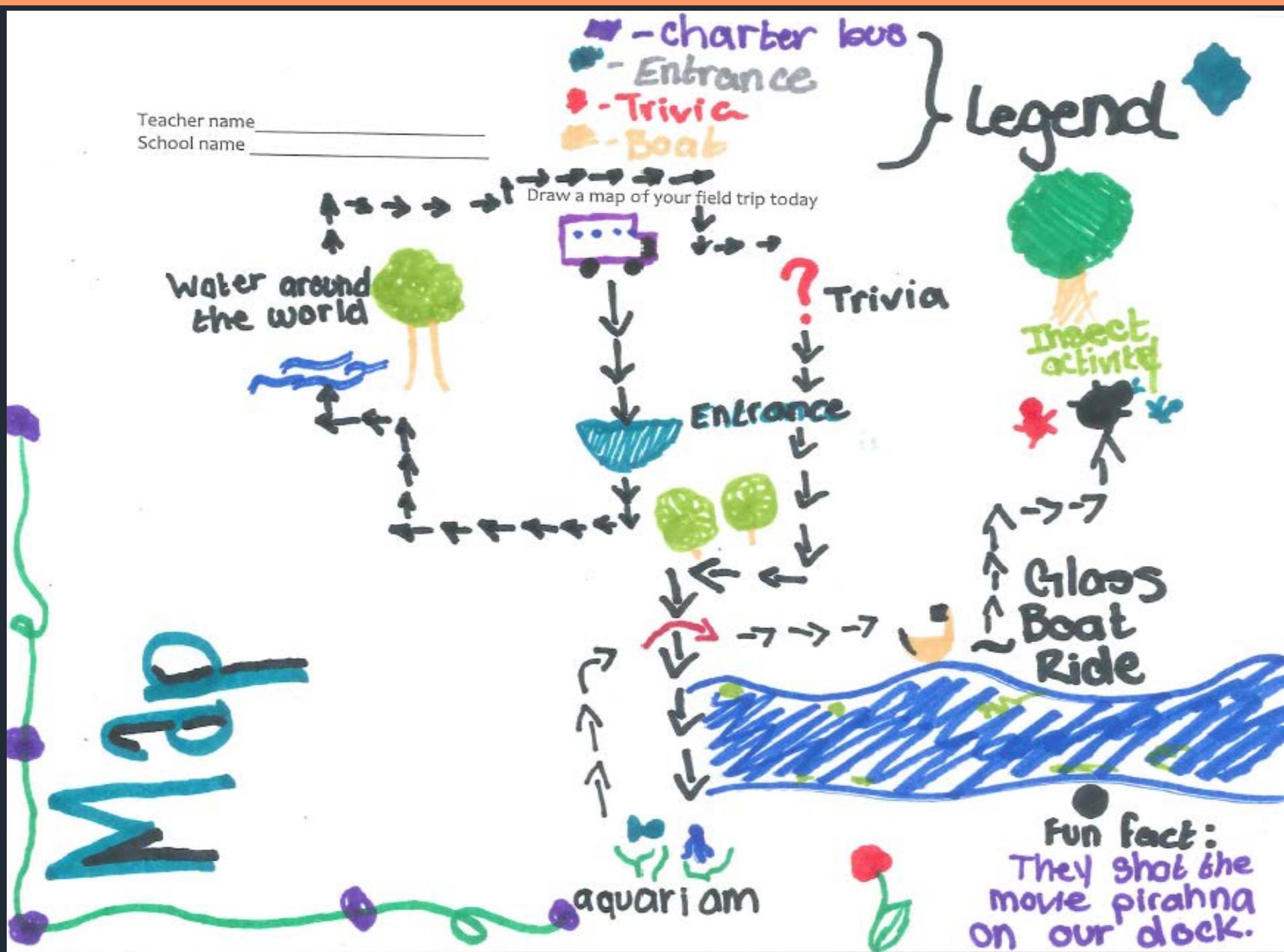
Draw a map of your field trip today



Results: Elements of Cartographic Features

	N	%
Cartographic convention <i>Chi Square = 333.3 (P = 0.000)</i>	129	16.9%
Perspective <i>Chi Square = 330.1(P = 0.000)</i>		
Overhead	318	41.7%
Oblique	143	18.8%
Combination	294	38.6%
None	7	0.9%
Chronological order <i>Chi Square = 309.9(P = 0.000)</i>	138	18.1%
Text <i>Chi Square = 71.8(P = 0.000)</i>	498	65.4%
Color <i>Chi Square = 290.0(P = 0.000)</i>		
One color	334	43.8%
Multiple colors	393	51.6%
None	35	4.6%

Example of maps (Elements of Cartographic Features)



Example
of maps
(Elements of
Cartographic
Features)



Written Descriptions: Qualitative Themes

- **Positive feelings**

- Nature
- Favorite activity
- Educational component

- **Negative feelings**

- Weather conditions
- Amount of activities
- Duration of the fieldtrip

Examples:

- *amazing how nature is...*
- *I loved the glass boat ride...*
- *...We learned about endangered species...*

Examples:

- *The sun is making us suffer...*
- *...Too much work*
- *...I woke up @ 5 and I'm tired.*

Example
of maps:
Negative
feelings



Written Descriptions: Qualitative Themes

- Chronology

First we went to the Aquarium and looked at endangered species. Then we took a walk on the boardwalk and looked at all the wetland...

- Map Legend

- *[black square] - Parking lot/roads. [orange square] - Paths. [pink square] - Boat docks.*

- Other

- *I drew a bridge, water, and a house of education. I drew boats on top of the water ...*

Conclusions

- **Anthropogenic elements seemed to be dominant** (further analysis needed)
- **Limited use of cartographic elements**
 - Texas schools start teaching about maps in elementary school
- **Written descriptions offer context to the maps**
 - positive and negative feelings
 - experience of activities
 - map design elements

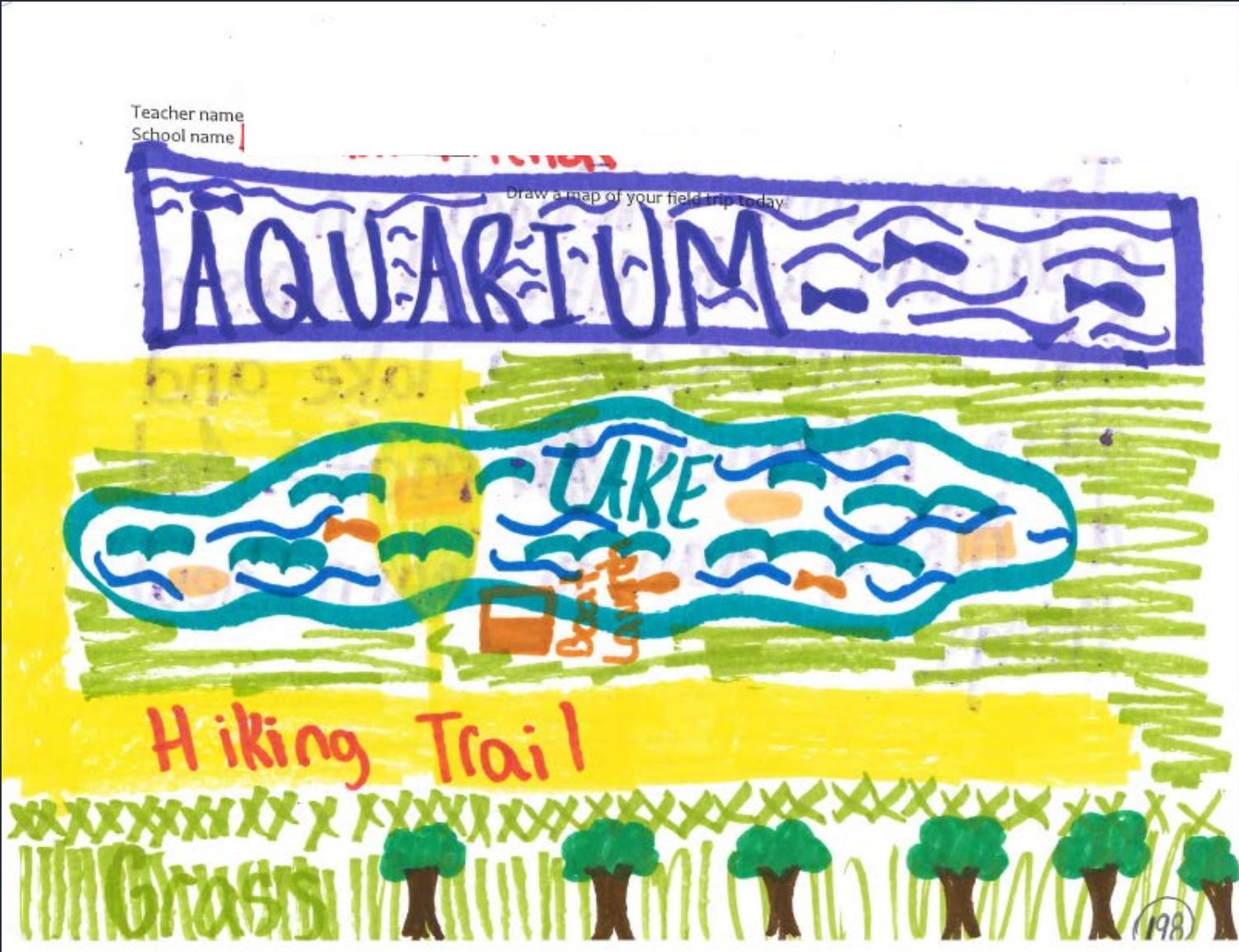
Limitations of Study

- Without children's interpretation, the understanding of their drawings might be limited.
- The time of the mapping activity was not the same for all groups.

Future Research

- Analysis of children's experiences based on the degree of urbanity, school district and demographic data
- Cross-grade analysis

Thank You!



Appendix 2
The Meadows Center for Water and the Environment
Mapping Module Questionnaire for Interpretive Guides

1. Name of School _____
2. Name of Teacher _____
3. Grade _____
4. Name of Guide _____
5. Date/Time _____
6. Number of Students _____
7. Other observations

Collect the maps from the students. Then show them examples of the maps. Then tell them maps have:

- Key
- Scale
- Compass/north arrow
- Some have Grids

Ask students please raise your hand if your map has this:

1. Is an aerial view? Write down number of hands

2. Did you have a compass/ North arrow? Write down number of hands.

3. Did you include a scale? Write down number of hands.

4. Have you drawn a map before? Write down number of hands.

Then ask them what did they include in your map? Write examples.

Follow-up questions for the interpretive guides

1. How prepared did you feel after your training session on a scale from 1 to 5, with 1 being not at all prepared, and 5 being very prepared.

2. Did you follow the script? Yes/ No

If No, then explanation _____

3. Was the time expected correct? Yes/No

If No, then explanation _____

4. Were there any extraordinary events that affected the activity? (Examples: sick kid, rain, etc....)

Data Collection Protocol

I. Summary of the project and Data Collection Plan

The purpose of this study is to examine children's perceptions of nature and the spatio-temporal characteristics of maps. The participants of this research will be k-12 children who signed up for a field trip at the Meadows Center for Water and the Environment at Texas State University in San Marcos, Texas. The estimated number of participants is 300. The investigators formulated this study based on an extensive literature review on utilizing sketch map method for understanding children's perceptions of nature. This study will be designed based on previous research experience with a small sample.

II. Collection of Data: Before, During and After collection

Tour Coordinator Training. Investigators will train Meadows Center tour coordinators to ensure that appropriate information is collected from, and provided to, teachers prior to their arrival at the Center. Tour coordinators are Meadows Center staff who interfaces with teachers and books all the field trip tours.

In the weeks prior to field trip bookings, estimated to occur in April 2017, investigators will train tour coordinators on the research goals, meaning of non-identifiable data collection, and an overview of the importance of following the data collection protocol.

Tour Coordinator Data Collection Protocol.

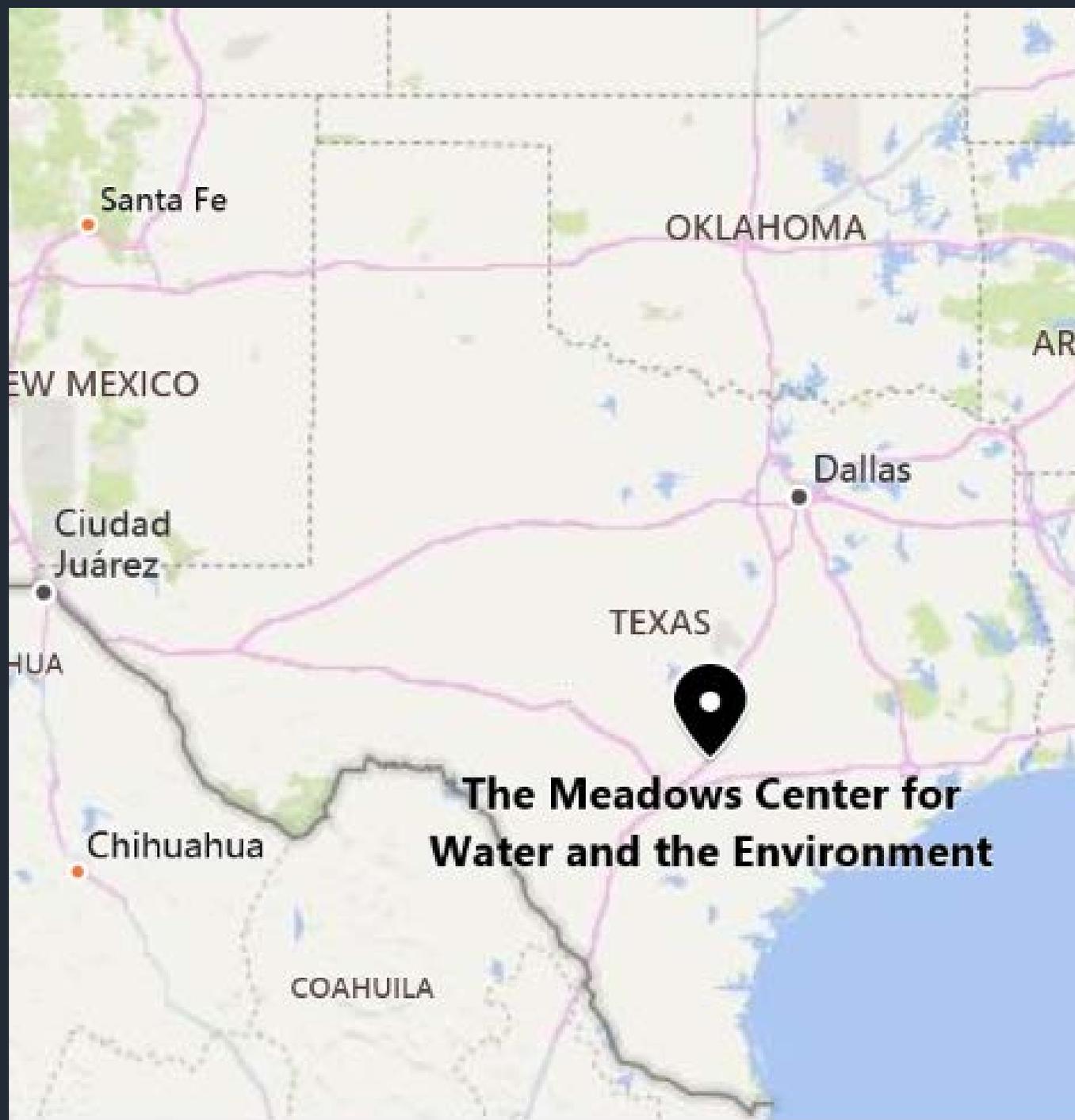
1. When teachers contact the Meadows Center to schedule a field trip, the tour coordinator will collect information on whether teacher self-selected the mapping module or whether it was included as an add-on (i.e., did not request, but will be included at the end of the field trip).
2. If teacher did not self-select the mapping module, the tour coordinator will ask whether the teacher would be willing to add-on the mapping module to the end of the field trip.
3. Tour coordinators document selection in existing Meadows Center registration logs.
4. For those teachers that agree to include the mapping module, tour coordinators will provide teacher with modified tour booking forms that include required language as part of researcher data collection IRB requirements.

Interpretive Guide Training. In the weeks prior to field trips where data are collected, investigators will train Meadows Center's interpretive guides, estimated to occur in April 2017. Interpretive guides are Meadows Center employees who deliver the educational modules during field trips and are typically Texas State University undergraduate students. The training session will include:

1. 15 minute training session with all interpretive tour guides on data collection protocol. The training will include a description of the research goals, non-identifiable data collection, and an overview of the importance of following the data collection protocol for quality research.
2. 15 minute demonstration of data collection protocol and timing, including:
 - a. 10 minutes for map: "For the next few minutes use the colored markers to draw a map of your field trip today on the sheet provided." (See appendix 1, mapping sheet)
 - b. 5 minutes for explanation: "Now take a few minutes to write down what you included in your map on the back of the sheet provided."
 - c. During a & b above, interpretive guides will fill out Mapping Module Questionnaire for Interpretive Guides questions 1-8. (See appendix 2)
 - d. Collect the maps
 - e. 5-10 minutes for interpretive guide-led discussion and questions about mapping and cartography using the Mapping Module Questionnaire for Interpretive Guides.
 - f. After each mapping module, interpretive guide will clip all maps collected from each group to the Mapping Module Questionnaire for Interpretive Guides form and store them in the Meadows Center's Ticket kiosk.

Interpretive Guide Data Collection Protocol.

1. Interpretive Guide will gather students and pass out clipboards with mapping sheet (See appendix 1).
 - a. "For the next few minutes use the colored markers to draw a map of your field trip today on the sheet provided." Allow 10 minutes for maps.
 - b. "Now take a few minutes to write down what you included in your map on the back of the sheet provided." Allow 5 minutes for explanation.
2. During 1a & 1b above, interpretive guides will fill out Mapping Module Questionnaire for Interpretive Guides questions 1-8. (See appendix 2)
3. Interpretive guides then Collect the mapping sheet.
4. Interpretive guides will next lead students in a 5 -10-minute discussion and question session about mapping and cartography using the Mapping Module Questionnaire for Interpretive Guides.



**The Meadows Center for
Water and the Environment**