ENVIRONMENTAL GEOGRAPHY EDUCATION

FOR ADULTS WITH

INTELLECTUAL/DEVELOPMENTAL DISABILITIES

by

Sara Holloway

A directed research report submitted to the Geography Department of
Texas State University in partial fulfillment
of the requirements for the degree of
Master of Applied Geography
with a specialization in Geography

May 2018

Committee Members:

Dr. Jennifer Devine

Dr. Injeong Jo

Table of Contents

I: Introduction

There is a growing population that is invisible to the world of geography education. That population is adults with intellectual/developmental disabilities (IDD). Geography education helps people understand the world around them, enhances lifestyle choices and encourages them to be better stewards of the environment (Heffron and Downs 2012). The IDD population deserves a chance to benefit from geography education as well, yet there are virtually no geography education IDD programs available to this population. This lack of geography education programs for adults with IDD is surprising given the fact that hundreds of thousands of individuals with IDD attend state-funded day activity centers across the United States that provide education and life skills training on a daily basis (MetLife 2010).

Individuals with IDD who age out of high school are encouraged to work in the community, however, due to varying limitations most individuals are unable to work a full-time job or even a part-time job. In turn, many adults with IDD participate in a day activity center to promote independence as well as give them a place to stay throughout the weekday while their caretakers work. These day activity centers vary in type, but nearly all provide and promote activities of independent living, such as developing social skills and money management.

Within day activity centers, there is an overall shortage of educational programs developed for adults with developmental disabilities. Most day activity center education programs are designed with the intent of developing social skills rather than knowledge acquisition. The programs that exist are often too complicated or simplistic. In addition, these programs have been used for many years and have become outdated.

To address the lack of appropriate, diverse and contemporary curricula for adults with IDD, this directed research project designs, implements, and evaluates an environmental geography education pilot program for adults with IDD. This project assesses whether knowledge acquired from the program improved participants' quality of life by increasing knowledge in geography. This project asks: how can an environmental geography education program improve adults with IDD's knowledge of geography, water resources, weather patterns, food processes and pollution? Also, what challenges exist with the implementation of an environmental geography education program within this population?

This directed research project argues and demonstrates that adults with IDD would benefit from an environmental geography program that enhances their knowledge of the environment as well as builds their social skills. Using methods of participant observation and focus groups, this research shows that adults with IDD acquired information about environmental issues that enables them to make better choices concerning environmental decisions in the world around them. In turn, this increases their wellbeing as well as helps them become more informed citizens. This research also reveals many challenges and lessons learned regarding environmental geography education programs for adults with IDD. One challenge, for example, is maintaining individuals' participation throughout the course as well as designing a program that is appropriate for various levels of disability.

This study identifies several learning and social benefits of an environmental geography education program for adults with IDD. The environmental geography education pilot program for individuals with IDD (EPIDD) focused on five topics to motivate participants to be aware of and

engaged in geographic and environmental issues. As this research illustrates EPIDD can help promote independence in students, increase their knowledge of the environment, and help them make informed decisions regarding resource management.

Adults with IDD are receiving out of date and repetitious material regarding hygiene and social skills. There is a need for diverse and relevant programs for the program for the adult IDD population, and environmental geography is a topic that can help this population become better environmental stewards, improve lifestyle choices and reduce risk in emergency situations. The purpose of this pilot study is to develop and test curriculum materials to build a complete environmental geography education program for individuals with IDD for use in any day activity center across the United States.

II: Background: Developmental Disabilities, Programs, and Day Activity Centers

Intellectual/developmental disability (also known as IDD) is defined as a limitation in one or more major life activities such as hearing, seeing, thinking, memory, etc. It affects individual's ability to live completely independent without assistance. Intellectual/developmental disabilities can begin at birth or a young age while others may be the result of accident, injury, or illness (Texas Health and Human Services 2016).

According to the Census Bureau's American Community Survey, approximately 12.9 percent or 3.4 million Texans had an intellectual disability in 2014. Eligible individuals receive services from state and federal government including personal attendants, day activity centers, and medical equipment (Texas Health and Human Services 2016). Over the past 12 years, developmental disabilities increased 17% while autism increased almost threefold (Texas Health and Human Services 2016). Males are twice as likely to have a developmental disability compared to females especially in Autism, ADHD, and learning disabilities (Texas Health and Human Services 2016).

There are different levels of need determined by an assessment for individuals, the levels are mild (IQ 52-70), moderate (IQ 36-51), severe (IQ 20-35) and profound (IQ under 20). Level of need is based on IQ, ability to complete basic tasks such as picking up objects to making a budget, as well as maladaptive behaviors. Maladaptive behaviors include injury to self, others, property, disruptive behavior, cooperative, attentive, etc. Individuals with mild IDD typically perform almost all tasks of daily living skills independently but lack basic social skills. For example, an individual lives on his own, drives to work every day however requires assistance

with making appointments, paying bills on time, and discussing issues with his employer. Individuals with moderate IDD performs most tasks of daily living skills with minimal assistance to complete a task. For example, an individual gets dressed on her own but required assistance to button her shirt and tie her shoes. An individual with severe or profound IDD requires assistance in all activities of daily living skills and may/may not have maladaptive behaviors. Severe and profound IDD ranges from being completely bedridden to extreme maladaptive behaviors. Individuals with severe or profound IDD typically require one on one supervision at all times. A day activity center hosts individuals who have mild to moderate level of need with one or two individuals with severe or profound level of need. Many individuals perform tasks of daily living independently or with little assistance at the day activity center.

As of September 1st, 2016, Health and Human Services in Texas assumed leadership in providing oversight on the rules and regulations that agencies follow for individuals with IDD. Previously, the Department of Aging and Disabilities Services (DADS) oversaw the rules and regulations for agencies to follow. In each legislative session, the legislature determines how much money goes into these services and agencies work within limitations of the budget to provide services. Some of the services offered to individuals are foster care, community outings, transportation for work, day activity centers, modifications of a home, or supported employment. Individuals receive services based on need and their program.

Texas has a myriad of programs for individuals with IDD and each program is different in funding and services provided. One successful program offered to individuals with IDD is Home and Community-based Services (HCS). This program offers foster care, group homes, nursing,

dental, day activity centers plus many more. Individuals wait ten plus years to be offered a spot in the program. Other programs offered to individuals are similar to HCS, however provides less funding and services but have a long wait list as well.

Almost every program such as HCS in Texas, offer day activity centers as an option for individuals to attend. Day activity centers are defined as a center where individuals go throughout the weekday five hours to participate in activities of daily living. There are over 4,600 day activity centers across the United States (MetLife 2010) The primary goal of a typical day activity center is to provide activities that are meaningful and promote independence of an individual. The typical size of a day activity center is 20-50 individuals with approximately one staff to ten individuals' ratio. Individuals attending usually have a diagnosis of IDD, for example, Autism or Down Syndrome.

Each day activity center is unique in structure and vary in size, dynamics, and activities. The structure of each day activity center is dependent on the company's policies; however, they must follow Health and Human Services rules and regulations of the day activity center. Money management, hygiene, and rights training are a few activities offered in day activity centers. Day activity centers also provide other activities such as arts and crafts, board games, and puzzles. Groups go out in the community at least twice a week to parks, museums, and learning centers such as the Meadows Center in San Marcos, Texas.

Day activity centers follow programs developed to promote independent living skills for individuals with IDD, however these programs are few and far between. One of these programs is

Special Natural Activity Program (SNAP). The SNAP curriculum entails topics dealing with a variety of issues faced by adults with developmental disabilities (Meyers 2010). Some of the topics offered are personal safety, community surroundings, stranger awareness, and communication. Each topic provides a 15-minute discussion on the selected topic. Staff select a topic from the curriculum to discuss in the day activity center. Due to lack of available programs, most center supervisors develop their own activities or curriculum within their center for individuals to follow. There are no programs available for adults with IDD that are geography or environmentally related.

To address this need, this pilot program provides curriculum materials to build upon and develop a complete environmental geography education program for adults with IDD. The main objectives of this pilot program are to 1) deliver five lessons of geography, water resources, weather patterns, food processes, and pollution and 2) identify ways to increase their knowledge of these subject areas, increase awareness and response to natural disasters, and lower individuals' impact on the environment.

Bluebonnet Trails Community Services in Central Texas is one of many centers that offers services to individuals with IDD. Bluebonnet Trails focuses on providing services and supports through their center or a network of private and public organizations (Bluebonnet Trails Community Services 2018). Bluebonnet Trails offers services in eight counties and has five day activity centers located within these counties. Bluebonnet Trails contracts with eight other day activity centers in the eight counties as well.

This research occurred at the Caldwell day activity center in Lockhart Texas, one of five day activity centers owned by Bluebonnet Trails. Approximately 20-30 individuals attend the day activity center throughout the week supervised by three direct care staff. The Caldwell day activity center provides services Monday through Friday from 9 am to 2:30 pm with a break for lunch. Individuals choose to attend all five days or less depending on their needs. All individuals are over the age of 18 up to 70 years old. This center hosts many older individuals with mild to moderate level of need with a different range of abilities. The Caldwell day activity center is a good choice to conduct the pilot program for adults with developmental disabilities due to its small size and the individuals that attend.

III: Literature Review: Geography Education, Benefits, and Curriculum

There exists little academic or applied research focusing on geography education for individuals with intellectual/developmental disabilities (IDD). This study contributes to this scholarly and practitioner gap by drawing on and contributing to three bodies of literature: designing geography education materials, benefits of adult IDD education, and intellectual/developmental disabilities curriculum development.

Designing Environmental Geography Education Materials

There are many ways to design geography education programs. Despite this diversity, research in geography education has three foci relevant to this study: geography education pedagogy, curriculum content, and what are called "secondary education" programs.

In K-12th grade and university settings, research on geography education pedagogy often focuses on how to motivate students to learn and solve problems in geography (Brown 2006, Roberts 2014, Treagust, et al. 2016) and the role of the instructor (Dochy, Van Den Bossche and Struyven 2005). Pedagogy provides teaching strategies from theories of learning and understanding students' needs and backgrounds. Research argues that motivating students and teaching geography in any setting requires adapting to societal changes. Some of these changes concentrate on adding technology in the classroom (Bell 2011). In public education classrooms, technological innovation may motivate students, but there exists little research on what motivates individuals with IDD to learn.

Other pedagogical concerns center on teacher-student roles and interactions. In the past, classrooms were designed with the teacher as authority and the student as passive listener (Brown 2006). Research contributes to several new ways for teachers to lead in discussion about geography related topics. Constructivist approaches suggest moving the educator from authority to facilitator of learning based on the learner's ability to reach specific learning outcomes. This approach gives students' more opportunities to participate in knowledge construction and make decisions of their own learning (Brown 2006).

The National Geographic Standards: Geography for Life (Heffron and Downs 2012) identify 18 standards in relation to the six essential elements of geography, which represent key content knowledge in geography for K-12 education: 1) The World in Spatial Terms; 2) Places and Regions; 3) Physical Systems; 4) Human Systems; 5) Environment and Society; and 6) The Uses of Geography. The learning objectives of the pilot program are associated with the "Environment and Society" element and the three Standards under this element: Standard 14 (How human actions modify the physical environment), Standard 15 (How physical systems affect human systems), and Standard 16 (The changes that occur in the meaning, use, distribution, and importance of resources).

In addition to standard education programs, there are also "secondary education" programs relevant to environmental geography education. These programs are non-formal education programs developed with specific groups in mind and provided by state, non-profit organizations or other commercial agencies (Rogers 2004). For instance, the Colorado River Authority provides educational programs about protecting the Colorado River for elementary and middle school students. National Oceanic Atmospheric Administration (NOAA) provides an instruction manual

on how to develop educational programs that cater to specific groups in mind. This instruction manual stresses that developed educational programs should fit the needs of the individual and his or her appropriate development level (National Oceanic and Atmospheric Administration 2009). For example, a ninth-grade student completes a case study on water conservation as compared to a fourth grader completing a 'seek and find' water conservation worksheet. Despite the recognition of the need for custom geography education curricula, currently there exists no geography content designed for individuals with IDD.

The literature also stresses that environmental education or geography should be taught on a regular and routine basis in order to continue student's motivation to be better citizens of the environment (Heffron and Downs 2012, Treagust, et al. 2016). Treagust (2016) focused on observing students from Year 4 (fourth grade equivalent) and Year 5 (fifth grade equivalent) and their environmental commitment. Even though students in Year 4 are younger, they understood environmental impacts and were more committed towards a sustainable environment than students in Year 5. The reason is students in Year 5 lacked an environmental education component in their studies (Treagust, et al. 2016). In addition, geography education should be built on experiences of everyday life, this helps improve motivation for a student's learning when they combine individual experience with an educational component (Brown 2006, National Oceanic and Atmospheric Administration 2009, Roberts 2014).

Existing research is limited by the scarce mention of individuals who do not fit student standards. Wolbring (2013) brushes on the topic that there exist little education opportunities for individuals with IDD yet does not design curriculum or guidelines. In 1997, Bennett reviewed

literature linking research between geography education and students with IDD. Bennett argues that a geography educator should include individuals with IDD in the classroom and focus should be on the implementation of geography programs to students in elementary schools that cater to the abilities of individuals with IDD. However, most teachers lack skills and experience teaching geography for individuals with IDD (Bennett 1997). While Bennett's research insights are certainly helpful, it is quite dated and requires an update with more information.

This directed research contributes to these gaps in geography education literature by developing a pilot program to fit the needs of individuals with IDD in a day activity center.

Benefits of Adult IDD Education

For individuals with IDD, there are numerous benefits of learning new skills such as gaining knowledge to help them succeed in employment or motivating them to improve their learning skills (Muller and VanGilder 2014). When individuals feel successful, it builds their confidence thus continuing their drive for more knowledge (Deagle and D'Amico 2016, Muller and VanGilder 2014, O'Rourke 2011, Wolbring and Burke 2013). This confidence leads to independence and self-efficacy and an increase in overall well-being for students, their families, and caretakers (Wilneff 2013).

Independence is an important goal that individuals strive to achieve no matter how small. The introduction of education helps foster that independence (Deagle and D'Amico 2016, Muller and VanGilder 2014, O'Rourke 2011, Wolbring and Burke 2013). Adults with IDD are more likely to participate in activities that promote independence as well as hands-on activity instead of

lecture-based curricula by giving them more opportunities to learn (Deagle and D'Amico 2016, Tyler, et al. 2015). An example would be providing individuals two options to discuss healthy living such as playing soccer outside to promote exercise or build a food pyramid out of recycled supplies to promote healthy food choices.

Project SEARCH is a one-year internship program for individuals with IDD aimed to prepare individuals for competitive employment by developing goals, learning work skills and exploring careers. The benefit of a program such as Project SEARCH and similar programs is that individuals increase their self-esteem and confidence boosts their independence (Muller and VanGilder 2014). In Texas, Project SEARCH is steadily growing for individuals with IDD to gain competitive employment.

Self-efficacy is another benefit outlined for educational programs for individuals with IDD (Deagle and D'Amico 2016, Muller and VanGilder 2014, O'Rourke 2011, Tyler, et al. 2015). Self-efficacy builds motivation for individuals to learn throughout their life (Deagle and D'Amico 2016, Muller and VanGilder 2014, O'Rourke 2011). When individuals advocate for themselves, motivation increases learning and participation in educational programs.

Other benefits of educational programs include new awareness to individuals about improving health, math knowledge and literacy (Deagle and D'Amico 2016, Garcia, et al. 2011, Johnson 2014, Wilneff 2013). These educational programs provide individuals insight to new knowledge that otherwise would not receive outside of them.

This directed research highlight benefits associated with the addition of a new pilot program for environmental geography education for individuals with IDD. The pilot program helps participants acquire knowledge and be able to transfer this knowledge to informed decision-making in their everyday lives. This research aims to provide new insights about the benefits and challenges of environmental geography programs for adults with IDD.

Intellectual/Developmental Disabilities Curriculum Development

There is very little research on curricula development for individuals with IDD (Alexander 2015, Binkley, et al. 2014, Garcia, et al. 2011, Johnson 2014, O'Rourke 2011, Tyler, et al. 2015, Wilneff 2013). Curricula development or educational program research for individuals with IDD is a relatively new subject attracting more attention as the population of individuals with IDD increase around the world (i.e. Australia, United Kingdom, and the United States) (Jorgensen, McSheehan and Sonnenmeier 2007, O'Rourke 2011, Tyler, et al. 2015).

Research on educational programs for individuals with IDD range vastly from nutrition (Wilneff 2013) to health (Garcia, et al. 2011) to algebra (Rodriquez 2016). Most research for individuals with IDD and curriculum development draw on healthy living and food choices (Binkley, et al. 2014, Garcia, et al. 2011, Johnson 2014, Wilneff 2013). Rodriquez (2016) focused on teaching algebra to individuals with IDD, whereas Tyler (2015) focused on early reading skills for children with IDD.

Each program employed a different method to teaching developed curricula to individuals, such as using a video supported program to teach individuals about healthy eating (Johnson 2014).

As well as each program highlighted that curricula and surveys should be simple enough to understand by participants completing the research (Alexander 2015, Johnson 2014, Wilneff 2013). Many of these research programs highlight difficulties in measuring knowledge acquisition from the research (Binkley, et al. 2014, Garcia, et al. 2011, Wilneff 2013).

Wilneff (2013) developed a six-week pilot program for individuals with IDD on basic cooking and healthy food choices. This pilot program focused on individual and caretaker's participation in the program to assess whether individuals increased their healthy food choices and preparation of simple meals. At the end of the pilot program, both participants and caregivers reported that participants increased fruits and vegetables in their diet. In addition, the 'grocery store' activity positively changed caregivers shopping selection to healthier foods. While majority of food preparation from the pilot program continues to require staff assistance, individuals reported higher confidence in some food preparation tasks (Wilneff 2013). I draw on Wilneff's six-week framework to develop program lesson plans and a research methodology to access program impacts.

Many individuals are excluded from learning complex concepts and typically do not participate in educational programs due to this exclusion (Rodriquez 2016). However, programs can be modified to meet the needs and challenges of IDD individuals (O'Rourke 2011, Tyler, et al. 2015). For example, Tyler's (2015) reading program used flashcards to enhance visual understanding for students to improve reading skills whereas the regular practice material displayed a difficult layout and small print that made it hard for students to comprehend. In O'Rourke (2011), some modifications included adding six volunteer students who partnered with

the individual to complete the university course she enrolled in, the six students attended tutorials with the individual to work on material and assignments from the class. Modifications yielded positive results in understanding of the program however sometimes required more than the previous proposed modifications for comprehension.

Many studies identified that teachers or staff need to be supportive while working with individuals with IDD as well as supporting customized curricula for the program to be successful (Binkley, et al. 2014, O'Rourke 2011, Tyler, et al. 2015, Wilneff 2013). One research program outlined that teacher's perceptions on individual's competency greatly altered the way that an individual learned and influenced the outcome of an individual's knowledge (Jorgensen, McSheehan and Sonnenmeier 2007). Rodriquez (2016) noted that participants limit their participation when they lack a supportive environment. A supportive environment is an environment in which the individual makes their own decisions and the family/caretakers fosters the choice made. For example, if an individual decided to eat healthier, a family works on improving health and eating habits as well (Wilneff 2013).

Almost all research programs introduced to individuals with IDD displayed knowledge acquisition in the field selected. This reveals that there is a capacity for individuals with IDD to improve their health, wellness, etc. (Binkley, et al. 2014, Garcia, et al. 2011, O'Rourke 2011, Rodriquez 2016, Tyler, et al. 2015, Wilneff 2013). However, Johnson (2014) yielded neutral results. Several factors such as increased anxiety affected a few individual's choices during the pretest and posttest surveys.

Every program I reviewed used a small sample size and curricula typically lasted two to six weeks and up to six months (Binkley, et al. 2014, Garcia, et al. 2011, Wilneff 2013). There are few large-scale research projects and long-term research studies completed for individuals with IDD to determine if these programs improved knowledge on a long term or large-scale model. Project SEARCH is one of the longest running programs that studies employment education for individuals with IDD (Muller and VanGilder 2014). Multiple day activity centers as well as other healthcare facilities in Texas use Project SEARCH as a program for individuals with IDD today.

This directed research adds new program content (environmental geography) to the curriculum for individuals with IDD. In addition, the pilot program provides information on how to develop, implement, and analyze a pilot program in environmental geography education for adults with IDD. In doing so, this project draws on and contributes to three bodies of scholarly literature by bridging the gap between geography education and intellectual/developmental disabilities. These bodies of literature include: designing geography education programs, the benefits of IDD education, and curriculum development for intellectual/developmental disabilities.

IV: Research Methods: Development, Implementation, and Analysis

This directed research developed, implemented, and analyzed a new geography education program for individuals with developmental disabilities (IDD) in an adult day activity center. This chapter details this research project's methods in its three phases of development, implementation and analysis.

I used a humanistic geography methodology grounded in qualitative methods and analysis in my research. These qualitative methods include participant observation and focus groups to obtain data (Watson and Till 2010, Cameron 2005) and grounded theory (Charmaz 2006) and open coding methods (Cope 2010) to develop themes that display knowledge acquisition of geography and identify challenges to program implementation.

Research methods determine whether or not individuals with IDD acquired information about environmental issues using participant observation, extensive field noting and focus group methods in particular. The methods highlight challenges I encountered in curriculum design and implementation such as maintaining participation of individuals with IDD and assessing comprehension of individuals in the program.

The idea of the directed research derived from my experience as a Program Coordinator at a day activity center in Round Rock, Texas. I worked with adults with developmental disabilities for ten years. For four years, I worked directly with individuals providing activities that promote independence as well as taking them out into the community to places of their choice. For two years, I worked as Program Coordinator (supervisor) of the day activity center. When I became

supervisor for individuals with IDD, I began looking for programs for individuals to learn outside of hygiene and social skills development. While conducting this search, I found little in terms of education programs, and individuals are bored and unchallenged by the monotonous lessons that they have been taught their entire lives. In turn, I developed programs in healthy living, fishing, and money management. I found that individuals responded well to the introduction of new knowledge and asked for more programs like them. This experience motivated and prepared me to conduct this research for environmental geography education. Familiarity with the IDD population helped identify and develop lessons that will fit the abilities of the individual.

Development

This directed research contains two elements during the development stage: 1) development of the pilot program and 2) recruitment of participants in the day activity center. Both elements occurred concurrently prior to implementation of the pilot program. The Environmental geography Program for individuals with IDD (EPIDD) pilot program focused on five broad topics of environmental geography designed for adults with developmental disabilities in a day activity center (see Appendix A). The five topics are Geography, Water Resources, Weather Patterns, Food Systems and Pollution (see Table 1). Each lesson involved a thirty-minute discussion and an adjoining forty-five-minute hands-on activity. To enhance understanding, I created a total of eighteen '8x11' definition cards to accompany each lesson that enabled students to read each concept as well as view a picture or icon that represents the concept, such as drought with a picture of dry, cracked soil caused by drought (Figure 1).

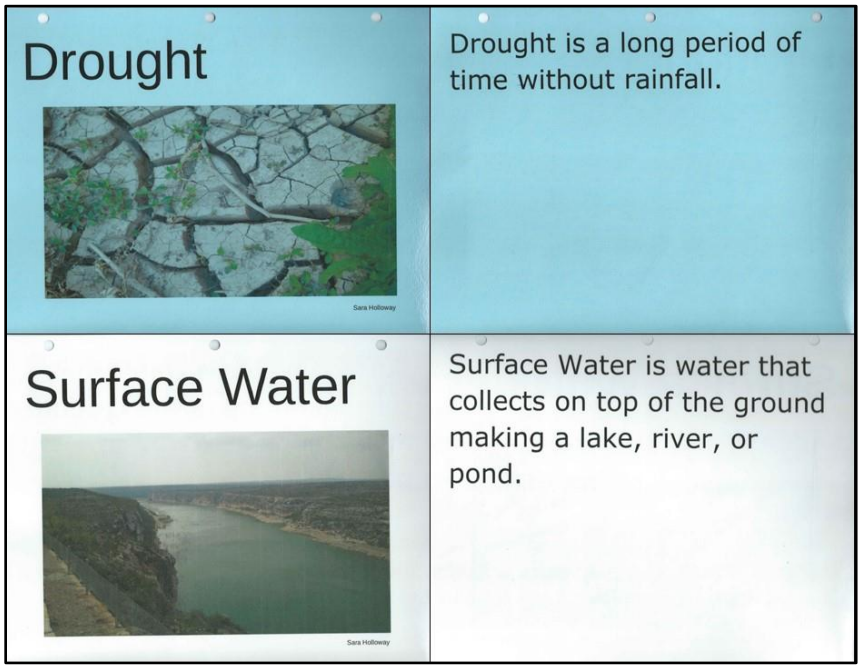

Figure 1: Definition Card example: two different definition cards provided during the pilot program

An overview of the EPIDD program is listed as follows (see Table 1). Lesson One: "Geography" focused on defining geography as well as maps, their uses and how to use one. The activity presented was a simplified version of a mental mapping activity where individuals draw their neighborhood to understand that maps can be interpreted in many ways. Lesson Two: "Water Resources" provided a lesson on the water cycle and the process water takes to go from ground to tap. The activity was a simplified version of the Major Rivers aquifer activity where individuals built an aquifer in a fish tank and pumped water from the ground (Lower Colorado River Authority 2008). Lesson Three: "Weather Patterns" explained the difference between climate and weather and discussed weather disaster events that occur in Lockhart, Texas. The activity involved making a tornado in a bottle (Steve Spangler Science 2017). Individuals used recycled 20 oz. bottles to build a tornado in the bottle. This lesson included a lesson on what to do in the event of each weather disaster. Lesson four: "Food Processes" discussed the process of a seed and identifying

where food comes from around the world. The activity involved making a sandwich and discussing which state/country each part of the sandwich came from. Lesson five: "Pollution" discussed different types of pollution that occur around the world as well as recycling and the process of recycling a product. The activity involved individuals going outside to pick up trash around their building and identifying what they could do to help the environment.

Table 1: Pilot Program Outlined Topics

Lesson	Topic	Objective	Definitions	Activity
One	Geography	Individuals will explain what geography is and identify what maps are used for.	Geography Location	Mental Mapping
Two	Water Resources	Individuals will explain the water cycle process and briefly describe how water travels to the tap.	Evaporation Precipitation Condensation Groundwater Surface water	Aquifer in a Fish tank
Three	Weather Patterns	Individuals will be able to explain the difference between climate and weather and be able to describe two major weather events.	Climate Weather Flood Drought Fire Tornado	Tornado in a Bottle
Four	Food Systems	Individuals will explain the process of where food comes from and define the difference between local and global food.	Local food Global food	Build Your Own Sandwich
Five	Pollution	Individuals will identify different types of pollution and explain ways they can decrease their footprint on the Earth.	Pollution Air pollution Water pollution	Pick it Up

This directed research concentrated on how individuals learn and draw upon problem-based learning for insight on pedagogical practices. EPIDD provided opportunities for individuals to be active in each lesson and develop solutions to environmental problems in their own community (Dochy, Van Den Bossche and Struyven 2005). The "Environment and Society" element from the National Geography Standards (2012) provided insight for the pilot program's objectives. For instance, "Water Resources" and "Pollution" reflected Standard 14.3A (identify

and describe examples of how human activities impact the physical environment). “Climate” referred to Standard 15.2A (identify and describe the locations of environmental hazards) and Standard 15.2B (describe and analyze the effects of environmental hazards on human activities). “Food Processes” used Standard 15.1A (describe examples in which the physical environment provides opportunities for human activities) as a measure to write the objective. These standards helped prepare and develop lessons to reflect the needs of the individuals.

EPIDD used modified lesson plans from Colorado River Alliance (Lower Colorado River Authority 2008) as well as Steve Spangler Science (Steve Spangler Science 2017) to fit the audience of adults with IDD. Modifications included using definition cards with a visual representation of the word, in addition, other means of visual representation concepts employed included a dry erase board to draw out a concept such as the water cycle. Another modification including lengthening time of explanation of each concept and activity. Lessons spanned two hours to reflect the typical day activity center schedule for individuals. Following this schedule minimizes stress and disruption to individuals by providing little change in their normal daily activity routine. Lessons provided opportunities for individuals to actively discuss and ask questions as opposed to lecture based discussions where individuals remain silent while the teacher speaks about the topic.

Prior to recruitment of participants, I received IRB approval as well as obtained permission from Bluebonnet Trails Community Services to use their day activity center for this research. To obtain permission from Bluebonnet Trails, I acquired permission from both the director of the Caldwell day activity center and her supervisor (Director of IDD Services), as well as Bluebonnet

Trails Board of Directors approved the research after receiving written documentation detailing the research project.

I recruited 12 individuals to participate at the Caldwell day activity center on January 23rd and January 30th. Individuals with mild to moderate level of need who wanted to participate in the pilot program had to be able to read, write, and communicate in discussions outlined in EPIDD in order to participate.

After recruitment, potential participants received consent forms for themselves and/or guardian to participant in the research project. If an individual has a legal guardian, his/her legal guardian signed the consent form. If any potential participants or their guardians had questions about the program, they had the opportunity to ask questions during my visits and given multiple methods of contact if any questions arose. This program was completely voluntary and separate from the day activity center activities offered throughout the day. Any individual choosing to stop participation was not penalized at the center.

Implementation

Individuals participated in the three-week pilot program at the Caldwell day activity center from February 6th, 2018 on Tuesdays and Thursdays from 10 a.m. to noon. The five lessons ended on February 20th, 2018. Afterwards, two focus groups occurred on February 22nd, 2018.

Nine individuals signed consents to participate in the program, each of these individuals had mild to moderate level of need, able to read, write, and communicate. The ages ranged from

30-45 years old for each of the individuals. Three individuals participated in all five lessons whereas one individual participated in one lesson. All individuals' names are changed to protect confidentiality further in the discussion.

The lessons occurred in one of the two big classrooms in the center. One of the classrooms has a full-size kitchen with a supply of water for lessons that includes tables and chairs lined up classroom style for structured activities. Structured activities are considered small meal preparation and making holiday cards. The other connected room has a couch set up to promote unstructured activities such as puzzles or playing on the Wii.

Each lesson was two hours long with a 15-minute break between discussion and activity. The break gave individuals time to rest and decompress from the discussion before beginning with the activity. Every lesson had a similar structure pattern as outlined (Table 2).

Table 2: Schedule of each lesson

10:00-10:15	Introduce topic
10:15-10:45	Discussion
10:45-11:00	Break
11:00-11:45	Activity
11:45-11:55	Reflection
11:55-12:00	Closing remarks

During lessons, I used participant observation to obtain data on how individuals respond to lessons and activities planned, as well as any challenges encountered. After each lesson, I spent thirty plus minutes taking extensive field notes on all the interactions that occurred during the lesson, noting what worked, what did not work, and mark down any room for improvements. For example, the first lesson's activity failed because individuals did not understand what constituted

a neighborhood, most individuals drew their house and nothing else included, and I recorded this insight in the field notes (Figure 2).

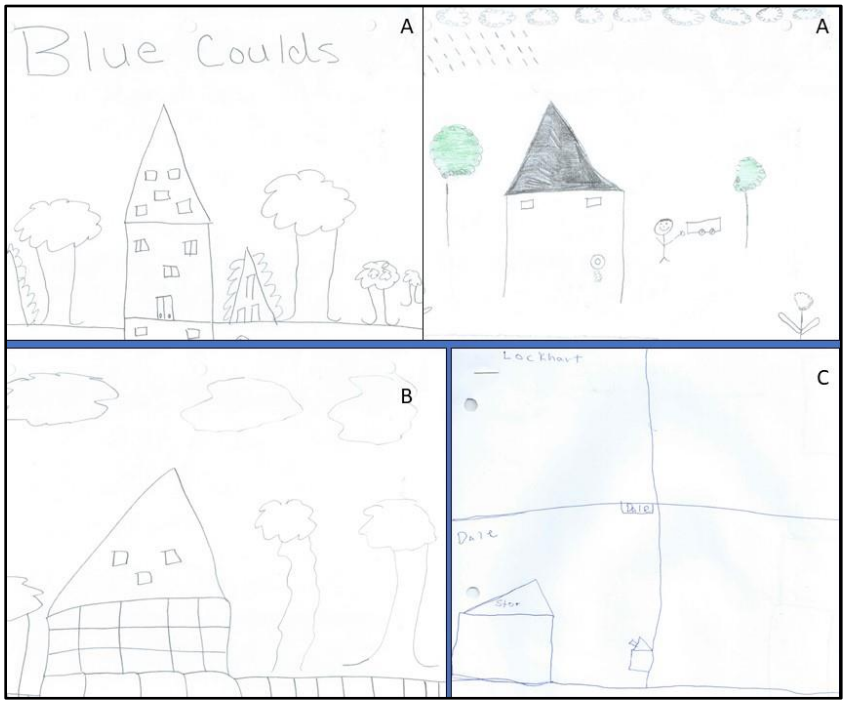

Figure 2: Neighborhood Drawings: Pictures drawn by A) Christie, B)

On February 22nd, I divided individuals into two deliberate focus groups to maximize attention and facilitate conversation while discussing their experiences. I audio recorded and transcribed each focus group. Each focus group was approximately 30 minutes long and held on the same day. The first group started at 10 a.m. and the second group started at 10:45 a.m. The focus groups occurred in an office adjacent to the day activity center (See Appendix B for the complete list of Focus group questions).

Two parts comprise each focus group session. The first part determined if individuals acquired knowledge in the five lessons of EPIDD. Each lesson had two knowledge acquisition questions. Some questions asked are: what are maps used for, what is the water cycle, and what

are possible weather disasters that can occur here in Lockhart? These questions had key words associated with them. If an individual mentioned a key word, I would mark that as an improvement in the knowledge for the concept. For example: I asked individuals what are different types of pollution? An individual answered water. This classified as improvement because when asked a similar question during the "Pollution" lesson, she was unable to produce an answer as noted by the field note.

The second part of the focus group asked how individuals felt about the program. These questions were open ended and allowed individuals to state their opinion on the lessons. Each lesson had one opinion question, as well as, questions encompassed several open-ended questions about the overall program. Some questions asked are: in what ways, did this class help you gain knowledge about our weather, what did you learn in this class about pollution, and which lessons did you like the best and why? Most answers from these questions resulted in "I liked it" with little delineation from that answer.

Of the six individuals who participated in the focus groups, three individuals marked improvement in two lessons by providing key word answers to knowledge acquisition questions. However, three individuals did not provide key word answers to any of the questions in the focus group.

Evaluation

I used grounded theory and open coding to develop ideas and arguments for the discussion from participant observation field notes and the focus groups recorded data. According to Charmaz

(2006), grounded theory does not use preconceived ideas or categories to construct theories but develops codes and categories from the data collected during analysis phase. I used these techniques to determine whether the program improved individuals' knowledge in the five lessons as well as whether individuals made an improved change in their choices of environmental issues such as water usage and recycling.

At the end of EPIDD, I revised the content of the program and created an instructor's manual for future staff members who have little to no geography background. Bluebonnet Trails received an edited version of EPIDD for dissemination to their five other day activity centers.

V: Discussion: Opportunities and Challenges of Environmental geography Program for individuals with Intellectual/Developmental Disabilities

This directed research produced five arguments using grounded theory (Charmaz 2006) and open coding (Cope 2010) from the data acquired from participant observation and focus groups. The first two arguments address the first question of whether and how an environmental geography education program can improve adults with IDD's knowledge in geography. Individuals displayed success in knowledge acquisition in "Food Processes" through integration of discussion and activity as well as understanding complex concepts in "Water Resources" such as the water cycle and water scarcity. The third argument identifies assessment feasibility to determine knowledge acquisition for individuals with IDD. The proceeding two arguments address the second question of what challenges exist with the implementation of an environmental geography education program by highlighting implementation strategies learned from the pilot program in addition to highlighting participation and engagement challenges that occurred during the pilot program. The last section provides implications from the results of the pilot program.

Success in food systems education

The biggest evidential success of knowledge acquisition is from Lesson Four: "Food Processes". In this lesson, I decided to use a different teaching method by integrating discussion into activity as opposed to previous lessons where they are separate. Previous lessons displayed knowledge acquisition, however, integrating discussion into activity showed higher comprehension in the concepts. When individuals got actively engaged in the discussion, they showed a higher level of comprehension during reflection. The previous lessons reflection time

consisted of repeating what they learned after receiving prompts. However, during reflection in this lesson, individuals identified main concepts without prompts.

In the lesson, individuals learned about the lifecycle of a seed and the process it takes to get to the grocery store from around the world. The objective of the lesson was for individuals to understand that food does not come from one single plant or from one single state or country. I asked individuals to tell me the life cycle of a plant from seed to adulthood. Many individuals were unable to describe the lifecycle or define what a seed is. I then described and drew the lifecycle from seed to adult plant. After the lifecycle diagram exercise, individuals identified the top three major crops in Texas: cotton, hay, and corn. I asked individuals which crops we could eat. They identified corn was the only crop that they could eat.

Using this knowledge, the lesson progressed to building a sandwich (the activity). Individuals received two maps: A United States map and a world map, I asked individuals to color in the state with the highest production of the food item displayed. The goal was to go through the parts of a sandwich and ask what type of plant made the item, identify the seed on the plant, and identify which state or country produced the highest amount of the item. For example: bread→ wheat: main ingredient in bread→ locate seed on upper stem→ Kansas: high producer→ identify state on map and color in. This was completed for every part of a sandwich. At the end of the lesson, I asked individuals what the maps represented. Not all the states were colored including Texas. Christie answered, "To show that our food comes from around the world and not just Texas". This answer required no prompts nor hints from me. When developing lessons, I included objectives for individuals to learn from each lesson. That answer was one of the objectives included

in the "Food Processes" lesson. Using this answer, I explained why it is better to shop locally (farmer's market) versus globally (grocery store).

This lesson probably displayed the most comprehension with individuals because not only did they have something to visually see and touch during the lesson, they required hands-on participation during the discussion. I received more answers similar to the above when asked the question of what the map represented. In addition, this lesson required the least number of prompts except when identifying states and countries.

From the focus group, Brad spoke on this lesson, not necessarily answered the question when asked where our food comes from, however he identified a few key words from the lesson,

> "Say that you um, we learned about crops and the garden, um,…and everything and uh, the farmer, the farmer used like, the farmer, he use the crops, he use and the crops are not the same as we use like, that one and we said farmers use like, like, one of those like one, the um, the crops like the use to, like cotton, and um, like cotton, and um, the wheat, is what we use, and everything, and um, and um, they use that like hay, right, like hay in crops, and the farmer go in the house, and it comes from the crops"

During focus groups, individuals identified this lesson as one of the most liked lessons. Out of six focus group individuals, four stated that this was their favorite of the five lessons, as well as they talked more about this lesson than other lessons when asked about food processes.

Food may have resulted in positive knowledge acquisition since food is a graspable concept. Individuals interact visibly with food daily as opposed to the water cycle which may seem invisible even though it is a process that constantly occurs. Even though, this visibility may have enhanced understanding of the lesson, it was the complex concept of understanding that food

comes from around the world identified as opposed to concepts already learned such as healthy food choices.

Integrating discussion into activity enhanced comprehension of the lesson more than other lessons. This lesson included multiple techniques such as using pictures of the plant, the real food product, and maps to fill in for each state or country identified as high producer of a product. Individuals understand and learn better when using multisensory stimulation: such as seeing a picture, touching a map, and eating the product. The comprehension of the lesson displayed improved knowledge in food processes from the pilot program.

Complexity at its best: Understanding the Water Cycle

There is a common misconception that individuals with IDD are unable to learn complex concepts and they are often not challenged by educational programs. Due to this misconception, individuals with IDD are rarely given opportunities to learn complex concepts such as the water cycle and water scarcity. The pilot program proves that individuals learn complex concepts when provided methods to learn these concepts.

In developing these lessons, I incorporated various teaching techniques for individuals to help participants understand the concepts. I taught the concepts using definition cards and a dry erase board for visualization of a concept. The activities also included kinesthetic activities to learn the concept. When learning of a concept is reinforced by multisensory stimulations and engagement, individuals with IDD understand it better.

An example of understanding complex concepts is through Lesson Two: "Water Resources". When I began the lesson, I asked individuals to explain the water cycle. None of the individuals identified one part of the water cycle. When shown the water cycle, individuals identified rain as part of the water cycle however that was the extent of knowledge of the water cycle. I provided definition cards of each part of the process of the water cycle from precipitation to condensation, to surface water and groundwater. Next, I used the dry erase board to draw out the process one step at a time to help them visualize the process.

Then, individuals completed the activity "Aquifer in a fish tank" (see Figure 2). This modified activity from LCRA Major Rivers teaching guide used kinesthetics for individuals to understand the concept. The activity began with building an aquifer with three types of soil (rocks, gravel and sand) to lay down with one side higher than the other into the fish tank. Everyone took turns laying down the foundation of the aquifer. Next each individual made it rain as they poured water from a pitcher into the dry ground. While it was raining, individuals observed that the surface was getting wet and the lower end was filling a lake. They stopped before it got to the top of the higher surface. At this point, we discussed the difference between groundwater and surface water.

Groundwater introduced a new concept to individuals that had not been discussed previously. When asked if they knew what groundwater was, no one answered. Most individuals have been inside of a cave, so I prefaced groundwater with a cave example. However, this gave individuals the idea that groundwater was a big hole in the ground filled with water, I wanted them to understand that not all groundwater (aquifers) had big pockets of water filled with them.

In the lesson, each individual pumped water using a turkey baster from the higher surface area. The higher surface area was dry so when the turkey baster filled up with water, it displayed that water was underneath the surface even though they could not visually see this water. It was at this point, that an individual exclaimed, “Oh this is groundwater, water from the ground”. At this moment, the individual understood that groundwater came from underneath the surface and not a giant hole in the ground filled with water. This led to the conversation to how water is a finite resource and how individuals can conserve water to protect our natural resource.

Figure 3: Aquifer in a Fish tank: displays the effects of groundwater pumping

By multisensory stimulations and engagement, individuals gained an understanding of the concept of the water cycle and water scarcity. During focus groups, individuals answered questions as close to accurate as they could. For example, when asked what the water cycle, Brad stated,

> "…I learned about the, in your class that we need, like, long time to, you brought the fish tank, you brought the fish tank, and we put rocks in it and everything and used one of those to pump up the water, we pumped the water out of the, it was dirty though, but we put it in the cup, and that was resources."

Another example of understanding complex concepts is Lesson Four: "Food Processes". When an individual articulated that our food comes from many locations not only Texas. Many individuals in the group understood that it takes a whole process for our food to come from the ground to our tables in our home. This concept required not only auditory and visually learning style but used kinesthetic learning style for individuals to touch and taste the concept taught. At the end of the lesson, individuals answered questions about local and global food, and how it food came to sit at the table in front of them.

Complex concepts are possible for individuals with IDD to learn, understand and engage using multiple teaching styles. Using only one style such as auditory does not stimulate an individual's learning process, this learning style will only affect a few individuals in the group and as observed through the pilot program, using only lecture-based teaching does not help individuals gain mindful knowledge of the concepts introduced.

Through the use of auditory (listening to the lesson), visual (looking at dry erase board and definition cards), and kinesthetic (using hands to build an aquifer) engagement, individuals identified complex concepts. Every lesson, I observed knowledge acquisition when I employed multisensory stimulations to teach complex concepts.

Assessment Feasibility-Participation Observation as an Evaluation Method

It is difficult to assess whether individuals with IDD improved their knowledge from the EPIDD program through standard means such as a test. This assessment difficulty is not only evident from the pilot program but from the literature as well (Johnson 2014). My first research question asks: how can a geography program improve adult with IDD's knowledge about the environment? In order to answer this question, I needed to assess individual knowledge acquisition.

I began this research project with several ideas of how to assess knowledge acquisition for individuals with IDD. During development, I developed a pre and post-test comparison for individuals to determine if the EPIDD program improved their knowledge. The test asked three multiple choice questions per lesson for a total of fifteen questions. An example of a test question is what is geography? While providing answers to each question, I realized that many individuals would not be able to answer these questions due to lack of word recognition such as geography, precipitation, and aquifer. Many individuals have not seen nor heard these words used in context in many years or at all. Individuals would have difficulty answering questions without explanation of each word and their meaning. In turn, answers provided would be either the first answer they see or a simple guess to answer each question. It would display improvement during post-test due to word recognition, however, pre-test results could not be compared due to data inaccuracy of the answers. To solve the problem of reading difficulty, questions and answers could be read aloud to individuals. In a group setting, individuals may answer verbally, which may cause others to respond to the verbalized answer. Individually, participants may answer the question from cues that staff displayed while reading answers to each question. After considering these factors, I

determined that a pre and post-test comparison would not provide accurate data of knowledge acquisition.

This left me with interviews and focus groups for analysis. I eliminated interviews from the beginning. From my experience as Program Coordinator, most individuals are uncomfortable sitting one on one in an authoritative question style, it would too be intense, even when the individual understood that it was not a pass/fail questionnaire. To save time and reduce stress for individuals, I decided to use focus groups. Focus groups allow individuals to be in a comfortable setting with peers to answer questions about the EPIDD program.

From previous observations and during the pilot program, individuals typically answered questions differently from their peers for the simple reason of they are used to this. Many day activity centers, staff asks each individual the same question from lessons provided and everyone is expected to respond with a different answer than their peers. While teaching the EPIDD program, individuals gave different answers to each question asked during the lessons. If individuals answered with the same or similar answers to each question, this research would include interviews as well.

To assess knowledge acquisition, I used focus groups to analyze the first question of how an environmental education program can improve adults with IDD's knowledge in the five lessons. Six of the nine individuals participated in the focus groups for a total of three individuals per focus group. I used a pre-written list of open-ended questions and wrote expected key words to

assessment questions. If an individual answered with a key word, the individual received a mark of improvement to the lesson.

On February 22nd, 2018, I conducted two focus groups with three people per group. Individuals in each group were purposely divided. Individuals that worked well together stayed in the same group as well as I evenly divided the talkative and quieter individuals to ensure that everyone had an opportunity to speak. Each session began with a preface where I explained the purpose and structure of the focus group. Individuals had a chance to speak when I pointed at them to acknowledge it was their turn. I started with quieter individuals and progressed to more outspoken individuals.

During focus groups, it became apparent that individuals did not know how to respond to questions. Individuals responded to similar questions during the pilot program with the same difficulty as the focus group questions. Many individuals gave incorrect answers or did not respond to the question. For example: when asked what are some geography topics that we studied in this class? Answers ranged from water, ice, and math. Christie answered "resources", an identified key word answer. However, when asked what a resource was, she was unable to provide an answer. Using this example, I could identify that Christie improved knowledge because she answered resources however she did not know what a resource was, which, in turn, may mean that Christie did not improve her knowledge in the first lesson.

At times, individuals correctly answered assessment questions to the best of their ability. An example is an answer to lesson five, what are different types of pollution? In the first group,

an individual stated, “don’t drive a car, don’t drive a car, it will pollute the air” as well as another answer was “water pollution”, an identified key word. However, when asked the same question, other individuals answered incorrectly, for example, “look at maps”, when asked the question again, “fishes”, when I asked for clarity from her answer, she answered “tornados in a bottle”. Another individual answered correctly, however he had not attended the lesson, this meant that he had this knowledge prior to the pilot program.

Other questions displayed knowledge acquisition from the lessons. For example, when asked what is the water cycle?

> Greg answered, “Water cycle, as if water cycle, how the water underground condenses up and makes rain, water underneath the water, they dig it up and makes the water clean and they clean it out and that is what they use for water, recycle, it’s all about that.”

This was one of the few questions where I could assess improvement in knowledge for Greg from him using words such as “condenses up” and “makes rain”. Other answers from individuals included one-word answers such as “rain”, “lake”, “ground”, “hail” and “snow”. This question had the most key word answers as opposed to the rest of the questions where most answers either came close to the key words however none of the answers provided clear knowledge acquisition. This helped me identify that individuals acquired knowledge in the “Water Resources” lesson.

Other lessons, I could not identify if individuals acquired knowledge. For example, what is the difference between climate and weather? After a long pause, I offered individuals the opportunity to answer what is climate or what is weather? This was met with more silence. In both groups, only one individual responded with the same answer which was clouds.

Another assessment difficulty are questions about complex concepts. Answers for these concepts can be broad as well have no definitive answer. An individual can answer water to what is geography and the answer is partially correct. It makes it difficult for individuals to process correct answers when there is not a definitive answer.

In the focus groups, I asked opinion questions as well as assessment questions. These were met with similar answers to the assessment questions. One example is when asked "in what ways did this class help you gain knowledge about the weather?" Answers received were "I learned a lot about it" and "yea". Each opinion question received similar answers of "yes" and "I liked it". Even when the question was reworded to assist with clarity, answers continued to be "yes" and "I liked it".

I was unable to provide definitive results of knowledge acquisition from the focus group questions provided. Before the program ended, individuals asked if I would visit one more time after the program and I agreed. I visited the following Tuesday after the pilot program. While at the center, one staff member asked everyone in the center to tell me what they learned about kitchen safety that day. Kitchen safety is not a new topic and one most individuals are familiar with at a basic level. As everyone answered the question, it became apparent that answers were very similar to how they answered questions during the focus groups. For example, during the focus group, I asked Frank how he felt about the lesson. Frank replied, "He was on the phone and my mom was on the phone and I go beep and I take a bath. I take a bath and when it is clear I called my mom on the phone," Every answer was similar in response during the focus group. When

asked about kitchen safety, he answered in the same format. This shows that this format of question/answer may not be the best way to determine if knowledge acquisition occurred.

These experiences illustrate that assessment of knowledge acquisition for individuals with IDD is complicated yet not impossible. Assessments such as tests, interviews and focus groups may not provide accurate or reliable results when used with IDD populations. This research displayed knowledge acquisition through field notes from participant observation. Focus group answers enhanced evidence from participant observation to build arguments and themes. In doing so, one way to assess individuals is through participant observation.

I coded 21 observations of knowledge acquisition in my field notes. For example: at the end of the first lesson, individuals identified that maps are used for many purposes as well as at the end of the fifth lesson, individuals identified that one of the ways that they can help the environment is through picking up trash they see on the ground. Most observations of knowledge acquisition occurred during multisensory techniques especially when using kinesthetic learning method. These observations provided structuring of this chapter using open coding and grounded theory.

Strategies for Implementation

The second research question asks: what challenges exist with the implementation of an environmental education program within this population? While the former arguments focus on answering the first question, the following arguments look to answer this question.

I developed the pilot program for individuals with IDD confidently drawing upon secondary education resources, National Geography Standards, and problem-based learning to write this program. Prior to each lesson, I wrote an outline and practiced every lesson. Even through practice, I found that I learned more during implementation of these lessons as well as assessing whether individuals improved their knowledge in the five lessons. Some of the implementation strategies learned are simple, such as do not miss a step during the building of a tornado; otherwise tornados leak and individuals get frustrated when the activity does not work. While other implementation strategies learned are complicated and sometimes required changing lessons almost entirely to meet the needs of the individuals.

A strategy for implementation this study identifies is that lessons need to start at the fundamental level. My experience as Program Coordinator developed my understanding on individuals learning style, however, past educational programs provided were familiar and taught repetitively for years. This gave individuals a foundation of concepts that they already knew and understood. When I implemented EPIDD, it became evident that individuals lacked fundamental knowledge of geography related topics. There are two possible reasons, 1) is that they were not taught these concepts or 2) it has been many years since individuals heard these geography concepts. It is only at the basic level where we can build knowledge acquisition for complex concepts.

In the first lesson, individuals defined what geography was and made a map of their house and neighborhood (see Figure 2). This lesson failed since the concept was too broad for individuals to grasp. Geography is defined a multitude of ways and in many ways, a very broad subject. When

I developed the program, I decided to use a simple definition provided to middle school students. Geography is the study of the Earth's surface and its climate, countries, peoples, and resources. During class, I approached the definition by detailing each part of the definition. For example: Earth's surface could be mountains, hills, lakes, or the pavement outside. I began by asking individuals, what do you know about geography, no one answered. I pulled out the definition card, showed them the world map and read the definition to them. Then I asked, "What is the Earth's surface?" Another collective silence. I gave examples such as mountains, hills, etc. However, when I asked if they knew what a mountain was, they knew the word but could not associate the word to the actual concept of a mountain. There are no mountains in Lockhart or nearby for individuals to associate with. If individuals could visually see a mountain such as in a picture they would know exactly what a mountain is, however, as a word on its own, individuals were unable to comprehend what a mountain is. I did not bring pictures of mountains or other surfaces of the Earth, I brought many maps, none of which displayed Earth's surface except for aerial pictures. It was at this point, I realized that I needed to start at the basic level by defining and visually producing each concept. However, I proceeded with the lesson due to lack of visual tools to explain the rest of the definition. Both discussion and activity failed in terms of understanding concepts. In the next lesson, I redefined geography with visuals which helped individuals understand the definition and I proceeded to water resources.

This pilot program illustrated that it is critical when new concepts are introduced, they must start at the basic level before moving to a complex concept. This helps build a foundation of understanding for complex concepts. In the "Water Resources" lesson and the proceeding lessons,

I began each lesson with the fundamentals to ensure that they understood the complex concept being taught such as water scarcity.

Another strategy for implementation is repetition. Repetition is key to individuals understanding complex concepts, in multiple forms as well, not only repeating a concept over again. For example: in "Water Resources", I asked what the water cycle was, then displayed the definition cards with each part of the water cycle (precipitation, condensation, surface water). Next, I drew each part on the dry erase board (rain for precipitation falling to the ground moving to a lake for surface water). The lesson progressed to individuals making it rain from a water pitcher onto the surface of the fish tank. Brad displayed understanding from the water resource lesson during the focus group by answering,

> "I also learned that, uh, that we use, um, like, if its cloudy and the sun heats the water and everything and the water goes up to the clouds and then it rains, and it makes ice, and uh, make fog…and um, snow and ice. That is what I learned about."

Prior to the lesson, he could not identify what the water cycle was and by the end of class, he identified the process.

This research further illustrates that active engagement, positive reinforcement, and patience plays a major role in effective learning for individuals with IDD. During lessons, I gave everyone an opportunity to speak by asking each one of the individuals the same question and referred to their answers when it was correct later in the lesson. Individuals had the opportunity to add their individual experiences to lessons and I used these experiences to build on the lesson. This active engagement gave individuals confidence to continuously answer questions even when incorrect and consistently provide experiences to the lessons.

During lesson one, Frank did not respond to any questions or make comments on the lesson. In my notes, I wrote, "Frank lacked confidence to answer questions". Using the strategy of active engagement and positive reinforcement, by lesson three, Frank responded to every question I asked him, added his own experiences to the lessons and at times, had to be reminded to wait his turn to speak. Frank displayed a leap in confidence from the lessons due to this strategy.

The other part of this active engagement is patience to give individuals time to understand a concept. For example, groundwater required four steps for individuals to understand what is was completely. Groundwater began with a definition, progressed to a visual of groundwater, it was then related to individual's experience with caves, and move forward to individuals pulling water from the ground before individuals understood that groundwater came from the ground. At times, teachers lose patience and move on to the next subject before individuals grasp the concept. Individuals require time to answer questions, to process concepts and multiple teaching styles to learn concepts which requires patience from the teacher to aid in their learning.

Other effective strategies include using visuals such as pictures, definition cards, as well as using the community of Lockhart to relate to geographical concepts. During each lesson, time and time again, in my notes, I would write that I needed more pictures for individuals to visualize the concept. Definition cards helped individuals see a picture as well as view the definition of the word. During focus groups, I asked if definition cards helped individuals understanding during the focus group questions and individuals collectively said yes. Every class related individuals back to Lockhart and how the choices that they make impact the world around them. In the "Water Resources" class, we discussed the importance of being mindful of how much water they used,

such as turning off the faucet when they brush their teeth. As well as in the "Climate" lesson, we discussed what to do in the event of a tornado or fire.

There is an importance for me, as a teacher and researcher, to understand how individuals learn so that they can meaningfully make choices involving the environment by understanding that individuals require lessons at the basic level as well as using multisensory stimulation and engagement to be successful in knowledge acquisition. Other strategies include visuals and patience.

Engagement and Participation of Geography Education for individuals with IDD

The previous argument highlighted implementation strategies identified from the challenges of teaching an environmental education program to adults with IDD. These strategies focused on teaching lessons learned as the researcher. This argument identifies outside challenges that play a role in participation. I identified participation as a challenge in implementing the program whereas engagement yielded positive results.

This study defines participation as how many individuals attended all five lessons. Prior to the pilot program, ten individuals expressed interest in participating in the program. Of the ten individuals, nine signed consent forms. Each lesson except for lesson five, had a total of six to seven individuals attending each class. Only three individuals participated in all five lessons. One of the main reasons why classes remained consistently less is that one to two individuals had the flu each time. When one individual becomes sick in a day activity center, it spreads to the rest of the group. This is typical in high populated settings such as schools, business', etc. Lesson five

had four individuals attend the class. The driver for three of the individuals decided to quit transporting individuals on Monday before the fifth lesson. This is a typical occurrence for day activity centers where there is a reliance on public transportation.

These challenges in maintaining attendance is common for day activity centers and in turn, makes it challenging to implement a pilot program or any program into a day activity center. Attendance levels and individuals are constantly in fluctuation. It becomes difficult to assess true knowledge acquisition since some individuals missed lessons due to illness or no transportation. This is also evident in the literature, Binkley (2014) describes a change of administration that caused recruitment difficulty and a loss of a third of its participants during the research project.

I define engagement as the active participation of each individual during lessons. The biggest success of the EPIDD program is that individuals who participated in the lessons actively engaged in listening and participating during the entirety of each lesson and pilot program. Each individual answered questions, not always correctly, but everyone answered to the best of their ability. During activities, everyone participated in every step of the activity. Every individual participated in each lesson and program instead outside influences caused lower participation. During typical day activity centers, individuals require multiple prompts to stay focused on the topic discussed or activity presented. During the EPIDD program, individuals required only one prompt to stay on the topic. Even when presented with a difficult concept for an individual to understand, individuals continued to listen and engage in the discussion or activity. This displays evidence that individuals want more opportunities to learn new things and the world around them.

During lesson five, an individual asked if oil was a resource. The weekend prior to class, he was working with his caretaker on a car. As they were working with oil, he realized that he wanted to ask if oil was a resource because it was part of the discussion in a previous class. This proved that individuals actively thought about the lessons outside of class. While speaking with staff in the day activity center, she stated that individuals discussed with their fellow peers about the lessons they learned throughout the day after each lesson.

During focus groups, when asked were there any lessons that they did not like, everyone stated that they liked them all. Even when the question was reworded, individuals continued to say they liked them all except one individuals did say that he did not like the "Pick it Up" activity in lesson five. During each lesson, I did not observe a time where individuals seemed annoyed or frustrated with learning a topic or refused to participate in discussions or activities.

At the end of each focus group, I gave individuals the opportunity to ask any questions or make any comments.

> Brad said, "You taught us a lot, you taught us, how to, uh, you taught us that, um, where food comes from, you taught us the weather, how we get, like vegetables, and um taught us a lot of stuff, I'm done."
>
> Greg stated, "I like everything, I really appreciate everything, seriously."

A concern on implementation of the program was individual engagement and participation in the lessons provided due to content being geography. However, individual engagement and effort for each lesson eliminated this concern. Everyone seemed eager to learn something new but also, they wanted to learn more. Each lesson, individuals continuously asked questions about

environmental subjects outside of the lessons being taught. I ended the lesson by answering these questions. This proves that individuals want to be provided more opportunities to learn new topics.

Implications of the Pilot Program

One of the goals of the pilot program is to determine areas of improvement, limitations, and expand the curriculum materials to develop a full environmental geography education program for adults with IDD. This last argument highlights implications of the pilot program to be considered in future work on the topic.

During development, designing a curriculum simple enough yet cognitively appropriate educational program for adults with IDD is difficult. Individuals in a day activity center range in skill level from being able to accomplish difficult tasks such as triple digit math problems, while others have difficulty counting to ten. Educational programs need to cater to both of these individuals while also maintaining activities that advance knowledge acquisition as well. A way to provide activities and lessons that are difficult yet simple enough for individuals to understand is by using National Geography Standards which allow for understanding from the basic level to the more advanced level. Another suggestion is to provide lessons that increase in difficulty so that any individual can participate in the first few lessons and when they become too challenging, allow individuals to select another activity.

During implementation, a potential limitation is maintaining individual's attention and motivation throughout each topic and the duration of an extended program. Some lessons may not interest an individual, in turn, making it difficult for this individual to focus and engage throughout the lesson. Lessons should be engaging during discussions and activities to stimulate their

attention. A suggestion to maintaining attention is by providing new educational programs that provides multisensory stimulations and engagement as well as integrating discussions into activities.

During evaluation, this research relied heavily on participant observation to determine knowledge acquisition in environmental geography. In order for these curriculum materials to become an environmental geography curriculum, there must be an assessment to determine if individuals gained knowledge from the lessons provided. This research highlighted that standard test assessments for students do not work well for this population. A suggestion for assessment is to provide benchmarks throughout the lessons such as asking verbal questions or providing a small survey or activity for individuals to complete to assess knowledge acquisition. These benchmarks can provide ways to assess individuals without causing undo stress or unreliable test results.

These implications identified pedagogical strategies that can be effective for an environmental geography education program to cater to the needs of the individual with IDD. Using National Geography Standards, multisensory stimulations, and benchmarks are effective strategies in the development of a future environmental geography program for individuals with IDD.

This directed research project designed, implemented and evaluated an environmental geography education program for adults with IDD. It determined that individuals acquired knowledge on environmental topics. Using participant observation, this project identified successful knowledge acquisition for individuals with IDD in the “Food Processes” and “Water

Resources". Providing an integrated lesson of a hands-on activity and discussion was the best tool for success in comprehension for individuals during the "Food Processes" lesson. Individuals identified the objective without prompts and displayed more understanding than previous lessons. In "Water Resources", using multisensory stimulation and engagement, provided comprehension to individuals about the concepts of the water cycle and water scarcity. In the "Weather Patterns" and "Pollution" lessons, individuals displayed comprehension at the basic level, however, did not produce definitive evidence of knowledge acquisition on the main concept. The first lesson proved too complicated for individuals to learn due to the complexity and broadness of "Geography" as a concept. Lessons must start at a basic level for individuals to comprehend especially when introducing new or forgotten concepts. Teaching strategies include repetition in multiple forms, patience and engagement for individuals to understand complex concepts. Outside factors affect participation from individuals, however, introducing new concepts increases individual's engagement and attention through each lesson. The EPIDD program as well as the literature identified that there is a greater need for individuals to be provided opportunities to learn new concepts. The EPIDD program identified knowledge acquisition through participant observation and identified implications and improvements for the pilot program to become a program for individuals in environment geography.

VI: Conclusion

Individuals with intellectual/developmental disabilities (IDD) are invisible to the world of geography education. As the IDD population experiences increased growth and visibility in their communities, education remains unchanged. Hundreds of thousands of individuals with IDD attend day activity centers in their adult life so that their caretakers can continue to work and provide them opportunities to gain independence (MetLife 2010). However, lessons and programs provided for individuals have remained static for many years. While these programs are necessary and useful, individuals should be provided more opportunities to learn new concepts and grow as people and citizens.

In Texas, laws have changed to reflect the new ideology that individuals should not be separated from the community but integrated and provided opportunities to participate in activities outside of the day activity center (Texas Council for Developmental Disabilities 2018). With the introduction of more educational programs, individuals will increase their knowledge, which in turn, increases their confidence, self-esteem, and independence. These heightened traits is how individuals become more engaged community members by making their own choices in how they learn and interact with the environment around them. This is the direction that day activity centers are moving towards by increasing independence through a diversified and contemporary education that reflects the changing world and environment around us.

To address the lack of educational programs for the adult IDD population, this research project developed the environmental geography program for individuals with IDD that provides curriculum materials in the area of environmental geography. This directed research developed,

implemented, and analyzed an environmental geography program for adults with IDD through the use of participant observation and focus groups to answer the following questions: how can an environmental geography education program improve adults with IDD's knowledge of geography, water resources, weather patterns, food processes and pollution? What challenges exist with the implementation of an environmental education program within this population?

Using grounded theory and open coding, this research produced five arguments. First, standard means of assessment may not provide accurate data for adults with IDD when determining knowledge acquisition. This research relied heavily on participant observation to prove individuals acquired knowledge in environmental geography. Second, integrating discussion into activities such as "Food Processes" displayed successful knowledge acquisition when an individual identified the objective that food comes from all around the world and not only Texas without prompts. Third, using multisensory stimulation facilitated successful knowledge acquisition in "Water Resources", individuals identified concepts such as the water cycle and water scarcity. Fourth, in order for individuals to understand complex concepts, lessons must begin with basic ideas and move towards the complex concepts. Furthermore, instructor patience and individual engagement helps build participant confidence to answer and participate in activities. Fifth, participation is limited because individuals rely on caretakers or public transportation to attend day activity centers, which may cause unreliability in attending regularly or participating actively. However, when introduced to new concepts or education, individuals actively engage in discussions and activities available. This active engagement proves that individuals are eager to learn new concepts and should be provided opportunities for more education. The goal of the pilot

program is to expand into a full environmental geography program by providing implications from the research conducted during the program.

Future research is required to expand these curriculum materials into an environmental geography education curriculum similar to SNAP. This work would include developing more lessons on one particular topic of environmental geography that build upon one another. Some future directions include a second pilot study to ensure the validity of data collected by comparing the two studies as well as completing a similar study with the full curriculum to determine if and how the program enabled knowledge acquisition.

This research paves the way to incorporate individuals with IDD into the world of geography. The EPIDD program is a first step to bridge the gap between geography education and curricula development for individuals with IDD. With proper funding, this program could increase into a program similar to SNAP comprising of geography and independence building through environmental decision making. Individuals with IDD are increasing in number and visibility, environmental geography can help improve their understanding of the world and make them more informed citizens of the community around them.

Appendix A: Environmental geography Program for adults with Intellectual/Developmental Disabilities

Lesson One: Geography

Objective: Individuals will define geography and identify what maps are used for.

Procedure:

Introduce topic (15 minutes): This topic covers the definition of geography and identify different types of maps to explain their use.

Discussion (30 minutes)

What is Geography? Instructor will define and direct the subject to geography. Instructor will provide a definition of geography and present how geography relates to the individuals. Individuals will be shown different maps of Lockhart (Caldwell County) to illustrate that there are many ways to view their town. Instructor will point out distinguishing features in Caldwell County and then ask the class to identify areas that are important to them.

Break (15 minutes)

Activity (45 minutes)

Mental Mapping Individuals will be given a piece of paper and will be asked to draw their neighborhood including their house, streets, and any identifying features. After 30 minutes, individuals will be asked to turn in their drawing. The drawing will be used to explain how each person's view is different to define a place (i.e. houses vs streets). This will be used to explain how geography is a complex subject because there are many ways to define geography. Yet, simple enough for individuals with IDD to understand. This will also be used to explain how we use geography in everything that we do.

Instructor will ask a few individuals to describe how they got to the day activity center to illustrate that there are many ways to get to one location.

Reflection (15 minutes) Instructor check for understanding through review of concepts discussed and asking individuals what they learned.

Closing Remarks (1-2 minutes) Instructor will briefly discuss next week's topic.

Lesson Two: Water Resources

Objective: Individuals will explain the water cycle process and briefly describe how our water gets to the tap.

Procedure:

Introduce topic (5 minutes): This topic covers the water cycle and process it takes to get to the tap.

Discussion (30 minutes)

Water cycle Instructor will begin the lesson with the water cycle and give definitions of the water cycle process. Instructor will present a representation of the water cycle process on a picture. Instructor will ask the class where Lockhart gets their water from and instruct them where using a map of the aquifer and surface water. Instructor will then go through the water treatment process to show that not only does water come from the sky, it must go through a treatment process before we can safely drink it.

Break (15 minutes)

Activity (45 minutes)

Aquifer in a Fish tank** Instructor and individuals will go through the activity of building an aquifer and demonstrating where their water comes from. As a group, instructor will first build the aquifer following the activity instruction page and individuals will take turns with the steps of showing how the aquifer works.

Reflection (15 minutes) Instructor check for understanding through review of concepts discussed and asking individuals what they learned.

Closing Remarks (1-2 minutes) Instructor will briefly discuss next week's topic.

Lesson Three: Weather Patterns

Objective: Individuals will explain the difference between climate and weather and describe two major weather events that occur in.

Procedure:

Introduce topic (5 minutes): This topic covers the difference between climate and weather and explaining the different weather disaster events and explaining what to do in each situation.

Discussion (30 minutes)

Lockhart (Caldwell County) climate and weather Begin by giving the class the local weather of the day, discuss the seasons and local climate patterns. Instructor will explain the different weather conditions that the county faces and ask individuals what they would do during the events.

Break (15 minutes)

Activity (45 minutes)

Tornado in a Bottle Instructor will lead the class in making a tornado in a bottle. Individuals will divide into groups and build a tornado in a bottle together. Instructors will use the attached activity sheet to build a tornado in a bottle.

Reflection (15 minutes) Instructor check for understanding through review of concepts discussed and asking individuals what they learned.

Closing Remarks (1-2 minutes) Instructor will briefly discuss next week's topic.

Lesson Four: Food Processes

Objective: Individuals will explain the process of where food comes from and define the difference between local and global food.

Procedure:

Introduce topic (5 minutes): This topic will cover where your food comes from around the world and discuss local crops in Texas.

Discussion and Activity (60 minutes)

Food: Where does it come from? Instructor leads discussion on the lifecycle of a plant by drawing on the dry-erase board. Next, pass out a United States map and a World map. Individuals will use these maps to color in the states where parts of the sandwich were made. Next, individuals identify the top three crops produced in Texas: cotton, hay, corn. Individuals identify the seed on the plant and which one is edible for people. Next, individuals identify the main ingredient for each part of the sandwich (for example: bread → wheat → locate seed → identify highest producing state → Kansas →color in map). Grab bread and wheat picture. Show the picture of wheat after it has been identified as the main ingredient. Continue this with each part of the sandwich. After the maps have been filled in with all the states that helped produce the sandwich. Ask individuals what does the map represent? Potential answer: we receive our food from around the world not only Texas. Use this answer to define local food and global food.

Break (15 minutes)

Activity (25 minutes)

Individuals build and eat their sandwich from the ingredients used in the discussion section.

Reflection (15 minutes) Instructor check for understanding through review of concepts discussed and asking individuals what they learned.

Closing Remarks (1-2 minutes) Instructor will briefly discuss next week's topic.

Lesson Five: Pollution

Objective: Individuals will identify different types of pollution and explain ways that they can lower their footprint on the Earth.

Procedure:

Introduce topic (5 minutes): This topic covers sources of pollution and ways that a person can help lower the impact of pollution on the planet.

Discussion (30 minutes)

Pollution Instructor will begin by asking the individuals what pollution is. After a few individuals have shared their answers, instructor will show the individuals pictures of different sources of pollution. Instructor will show pollution on the ground, water, and air. Instructor will explain point source and non-point source pollution and footprint.

Break (15 minutes)

Activity (45 minutes)

Pick it up. Instructor will give a brief safety lesson about staying with the group and being careful of what to pick up. Hand out gloves and trash bags before going outside. The instructor will then lead them back inside and return to their seats for further instruction. The instructor will (potentially) show a few items from the trash and ask if they know who threw this out. Instructor will explain that by picking up trash is one way they can do a small part of lowering our footprint.

Reflection (15 minutes) Instructor check for understanding through review of concepts discussed and asking individuals what they learned.

Closing Remarks (1-2 minutes) Instructor will briefly discuss next week's topic.

Appendix B: Focus Group Questions

1. What are some of the geography topics we have studied in this class?
    a. Key words: Place, persons, resources, surface
2. What are maps used for?
    a. Key words: Show city, display many things, land use, directions
3. What have you learned about geography in this class?
    a. Open ended
4. What is the water cycle? What are its parts?
    a. Key words: precipitation, evaporation, condensation, rain, groundwater, surface water
5. Where does water go before it gets to the tap?
    a. Key words: Filtration, pumping, stages
6. How have we learned to protect water in this class?
    a. Open ended
7. What is the difference between climate and weather?
    a. Key words: climate is an average; weather is right now
8. What are possible weather disasters that can occur here in Lockhart?
    a. Tornado, flood, drought, fire
9. In what ways, did this class help you gain knowledge about our weather?
    a. Open ended
10. Where do our vegetables come from? How do they grow? Give examples.
    a. Key words: wheat => stalks; onions => underground; tomato => vine
11. What is the difference between local food and global food?
    a. Key words: distance; farmer markets; grocery stores
12. How does food get from the farms to the tables?
    a. Key words: trucks; ground; people; boat
13. What are different types of pollution?
    a. Key words: air, light, water, ground
14. What can we do to reduce pollution?
    a. Key words: Throw away stuff, recycle, turn off lights
15. What did you learn in this class about pollution?
    a. Open ended
16. What did you like best about this class?
    a. Open ended
17. How can this class be improved? Content, exercises?
    a. Open ended
18. Which lessons did you like the best and why?
    a. Open ended
19. Were there any lessons you did not like, why?
    a. Open ended
20. What was the most difficult part of the course?
    a. Open ended
21. What is the most important thing you learned in this course about geography?

Bibliography

Alexander, Amanda. "Engaging a Developmentally Disabled Community through Arts-Based Service Learning." *Journal of Higher Education Outreach and Engagement*, 2015: 183-206.

Bell, Frances. "Connectivism: Its Place in Theory-Informed Research and Innovation in Technology-Enabled Learning." *Internation Review of Research in Open and Distance Learning*, 2011.

Bennett, Wendy M. "Development of Geographic Literacy in Students with Learning Disabilities." 1997.

Binkley, Catherine J., et al. "Improving the Oral Health of Residents with Intellectual and Developmental Disabilities: An Oral Health Strategy and Pilot Study." *Evaluation and Program Planning*, 2014: 54-63.

Bluebonnet Trails Community Services. *Intellectual/Developmental Disabilities (IDD).* 2018. http://bbtrails.org/services/intellectual-developmental-disabilities-services/ (accessed February 02, 2017).

Brown, Tom. "Beyond Constructivism: Navigationism in the Knowledge Era." *On the Horizon*, 2006: 108-120.

Cameron, J. "Focusing on the Focus Groups." In *Research Methods in Human Geography*. Melbourne: Oxford University Press, 2005.

Charmaz, Kathy. *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis.* Thousand Oaks: SAGE Productions, Ltd, 2006.

Cope, Meghan. "Coding Transcripts and Diaries." In *Key Methods in Geography*, 440-452. London: SAGE, 2010.

Deagle, Elena, and Miranda D'Amico. "Defining Meaningful Literacy: Findings from a Socially-Oriented Literacy Intervention for Adults with Developmental Disabilities." *Internation Journal of Disability, Development & Education*, 2016: 163-180.

Dochy, Filip, Piet Van Den Bossche, and Katrien Struyven. "Students' Perceptions of a Problem-Based Learning Environment." *Learning Environments Research*, 2005: 41-66.

Garcia, Alicia C., Sandra Hobson, Chwen Johnson, and June Matthews. "Nutrition and Food Skills Education." *Canadian Journal of Dietetic Practice & Research*, 2011: 7-13.

Heffron, Susan, and Roger M. Downs. *Geography for Life: The National Geography Standards, 2nd Edition.* Washington, D.C.: National Council for Geographic Education, 2012.

Johnson, Chwen. "Development and Pilot Testing of a Health Eating Video-Supported Program for Adults with Developmental Disabilities." *Canadian Journal of Dietetic Practice & Research*, 2014: 140-144.

Jorgensen, Cheryl M., Michael McSheehan, and Rae M. Sonnenmeier. "Presumed Compentence Reflected in the Educational Programs of Stuents with IDD before and after the Beyond Access

Professional Development Intervention." *Journal of Intellectual & Developmental Disability*, 2007: 248-262.

Lower Colorado River Authority. *Lesson 3 Texas Water Supply and Planning.* Lesson Plan, Austin: LCRA, 2008.

MetLife. *The MetLife National Study of Adult Day Services.* New York: MetLife Mature Market Institute, 2010.

Meyers, John. *Specific Natural Activity Program (SNAP) Curriculum.* 2010. www.snapcurriculum.org (accessed February 02, 2017).

Muller, Eve, and Rebecca VanGilder. "The Relationship between Participation in Project Search and Job Readiness and Employment for Young Adults with Disabilities." *Journal of Vocational Rehabilitation*, 2014: 15-26.

National Oceanic and Atmospheric Administration. "Designing Education Program." *National Oceanic and Atmospheric Administration .* April 2009. http://www.noaa.gov/sites/default/files/atoms/files/DEP%20Manual_2ndEdt_Final.pdf (accessed February 02, 2017).

O'Rourke, John. "Inclusion at University: Can We Do More Than Open the Door?" *Journal of Social Inclusion*, 2011: 19-33.

Roberts, Margaret. "Powerful Knowledge and Geographical Education." *Curriculum Journal*, 2014: 187-209.

Rodriquez, Anthony M. "Learning to Apply Algebra in the Community for Adults with Intellectual Developmental Disabilities." *Intellectual and Developmental Disabilities*, 2016: 19-31.

Rogers, Alan. "Looking Again at Non-Formal and Informal Education-Towards a New Paradigm." *The Encyclopedia of Informal Education 2*, 2004: 158-159.

Steve Spangler Science. *Tornado in a Bottle.* 2017. https://www.stevespanglerscience.com/lab/experiments/soda-bottle-tornado (accessed December 12, 2017).

Texas Council for Developmental Disabilities. *Daytime Habilitation in Texas.* 2018. http://www.tcdd.texas.gov/resources/fact-sheets-issue-briefs/daytime-habilitation-texas/ (accessed February 20, 2018).

Texas Health and Human Services. *Disability.* 2016. https://hhs.texas.gov/services/disability (accessed February 02, 2017).

Treagust, David F, Arlene Amarant, A. L. Chandrasegaran, and Mihye Won. "A Case for Enhancing Environmental Education Programs in Schools: Reflecting on Primary School Students' Knowledge and Attitudes." *International Journal of Environmental and Science Education*, 2016: 5591-5612.

Tyler, Emily, John C Hughes, Meadhbh M Wilson, Michael Beverley, Richard P. Hastings, and Bethan M. Williams. "Teaching Early Reading Skills to Children with Intellectual and Developmental

Disabilities Using Computer-Delivered Instruction: A Pilot Study." *Journal of International Special Needs Education*, 2015: 1-11.

Watson, Annette, and Karen E. Till. "Ethnography and Participant Observation." In *The SAGE Handbook of Qualitative Geography*, 121-137. London: SAGE Publications Ltd, 2010.

Wilneff, Meghan Ann. *A Pilot Study: Effectiveness of Basic Cooking Skills and Nutrition Education for Adults with Disabilities and Caregivers.* PhD Thesis, Columbus: Ohio State University, 2013.

Wolbring, Gregor, and B. Burke. "Reflecting on Education for Sustainable Development through Two Lenses: Ability Studies and Disability Studies." *Sustainability (Switzerland)*, 2013: 2327-2342.