U.S. Department of Education Green Ribbon Schools Award from 2012, 2013, and 2014: Teacher Perceptions of Ecological and Democratic Principles

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Abstract: The study was a descriptive and correlational quantitative study of U. S. Department of Education Green Ribbon Schools (ED-GRS) teachers' perceptions of ecological and democratic principles in their schools. Descriptive statistics described the ED-GRS teachers' perceptions of how the ecological and democratic principles operate in their schools. Correlations were used to look deeper at the ecological and democratic principles and to what extent these principles were related. Teachers in ED-GRS award winning schools reported evidence of ecological and democratic principles. The findings suggested that ecological and democratic principles had a positive relationship among them. In addition, there were seven principles that had strong, positive relationships among each other as perceived by teachers in ED-GRS award winning schools. I concluded from the data that sustaining ecological change requires evidence of democratic leadership and community. This study contributes to the field of educational leadership by providing a descriptive analysis of a newly-created United States Department of Education award. In addition, this study provides schools and school leaders with information as how to make sustainable changes that lead to healthy, high performance schools including a theoretical framework to provide guidance in making the sustainable changes.

Keywords: democratic principles, ecological principles, green school, sustainability, U.S. Department of Education Green Ribbon Schools (ED-GRS), whole school sustainability

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U.S. Department of Education Green Ribbon Schools Award from 2012, 2013, and 2014:
Teacher Perceptions of Ecological and Democratic Principles

All students deserve a world-class education. I stand by this statement as it drives the work that I have been doing in public schools for the nearly twenty years. I believe that schools can always be better; we haven't arrived at a time when all schools are healthy, high performance schools, "green schools" or schools that embrace whole school sustainability. One of the most quoted definitions of sustainability is from the UN Brundtland Commission:

> Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. (United Nations, 1987)

Birney and Reed (2009), in their leading sustainable schools report, stated that sustainability "is about engaging, learning and teaching to create a positive, empowering future for our children and their children" (p. 3). Schools and school facilities need to be sustainable. In March of this year (2016), 21st Century Schools Funds, Inc., USGBC and the National Council on School Facilities published, "2016 State of Our Schools: America's K–12 Facilities." This report exposed the need for federal and state assistance in allocating the appropriate funds to meet the current needs of school facilities. The report stated that 99 billion dollars are currently being spent each year on facilities, but 46 billion more is needed to ensure that all children are learning in adequate and equitable school facilities (p. 6).

There is a trend that schools are moving in the direction of becoming more sustainable or green. The U.S. Department of Education is showcasing these schools, school districts and post-secondary institutions with the Green Ribbon School (ED-GRS) award in April of each year. Since 2012, 367 schools, school districts and post-secondary institutions have received this prestigious non-monetary recognition. However, the percentage of schools that are receiving this award is less than 1/2 of one percent of schools in the United States. This is according to the U.S. Department of Education, National Center for Education Statistics, which states that there are approximately 98,271 public schools and 33,619 private schools (NCES, 2016).

The purpose of this study was to further my recent study which examined the 190 school applications that received the ED-GRS from 2012, 2013, and 2014 (McKey & Kensler, 2016). The first study was a mixed-methods study in which I reviewed the award-winning school applications; wrote a deep descriptive analysis and then applied formal grounded theory through the use of a theoretical framework, the Ecological Democracy for Whole School Sustainability (ED-WSS) framework (Kensler, 2012). The results of the first study revealed a need to extend my research of ED-GRS focusing on teachers in these ED-GRS schools; examining evidence of sustaining beyond the ED-GRS award. The present study is different than the three other ED-GRS studies currently published (Sterrett & Imig, 2015; Sterrett, Imig & Moore, 2014; Warner & Elser, 2014). My study is focused on teacher perceptions of ecological and democratic principles within their ED-GRS award winning school and exploring to what extent a

relationship exists between teacher's perceptions of practicing ecological and democratic principles. This data was collected through an anonymous online survey which asked teachers to reflect on organizations, processes and systems in their school that were aligned to the three pillars of the ED-GRS: (1) reducing environmental impact and costs, (2) improving the health and wellness of schools, students and staff, and (3) providing effective environmental and sustainability education (U.S. Department of Education [E], n.d.).

The first three years of the ED-GRS award recognized 190 K-12 schools. This paper presents the findings of a quantitative study focused on teacher perceptions of ED-WSS in their ED-GRS award winning schools. Following a brief introduction to the ED-GRS award program, I describe the theoretical framework of ED-WSS (Kensler, 2012) and an overview of the empirical literature published on the ED-GRS.

ED-GRS Award Program

The U.S. Department of Education began recognizing schools for their sustainability efforts in the spring of 2012. The following year, the U.S. Department of Education added school districts, and in 2015, they added recognizing post-secondary institutions. Andrea Suarez Falken, Director of this award stated in the 2015 ED-GRS highlights document that:

> We are pleased to see that the award has prompted instructors, parents, students, and administrators nationwide to acknowledge the critical need for students to learn in a manner – and a place – that will sustain both them and the planet. These green schools, districts, and postsecondary institutions have taught us that it's not just *what* students are learning; the *where* matters too. (U.S. Department of Education [C], n.d.)

Schools, school districts, and post-secondary institutions use the ED-GRS framework of the three pillars (1) reducing environmental impact and costs; (2) improving the health and wellness of schools, students and staff; and (3) providing effective environmental and sustainability education (U.S. Department of Education [E], n.d.) to benchmark their progress in each of these areas. The applications are submitted to their state education agency, which then reviews, scores and submits the state's honorees to the U.S. Department of Education. The ED-GRS award winners are announced in April of each year. The honorees are invited to an awards presentation in Washington, D.C. each June. The benefits of being recognized as an ED-GRS school are: (1) cost savings (2) improved student and staff productivity (3) increased student engagement (4) enhanced critical thinking, civic skills (5) preparation for green jobs of the future and (6) reduced behavioral problems (U.S. Department of Education [G], n.d.).

Ecological Democracy for Whole School Sustainability (ED-WSS) Framework

Ecological Democracy for Whole School Sustainability (ED-WSS) framework (Kensler, 2012) emerged from her review of empirical literature describing green school practices from around the world. The ED-WSS consists of six ecological principles and ten democratic principles. The ecological principles were derived from the work of Capra (1996, 2002), and the democratic principles from the work of Fenton (2002) in which Kensler extended the initial definitions into the field of education. I used ED-WSS as the theoretical framework for my previous study which focused on the ED-GRS applications; focused on the question, "To what extent do the

ED-GRS award winning applications provide evidence that these schools fit a theoretical model of whole school sustainability (ED-WSS)?"
Table 1 lists the ecological principles, definition of the principle, and examples of the evidence from the ED-GRS applications (McKey & Kensler, 2016).

Table 1
Evidence of Ecological Principles in ED-GRS Award Winners, 2012–2014

Ecological Principle	Definition	Examples of evidence from ED-GRS award applications
Networks, Partnerships, and Diversity	All living things are connected directly and/or indirectly; dense, diverse networks and partnerships provide resilience.	WVU Extension Services Youth Nutrition Outreach, U.S. Forest Service Adopt-a-School, Arkansas Game & Fish Commission, Georgia Pacific, Chevron, Lockheed Martin, Alliance for Climate Education, The Nature Conservancy
Development	All life changes and evolves over time; change in living systems is natural and continuous within individuals, communities, and populations	Outdoor classrooms, sustainable school gardens, fruit orchards, Environment in Context (EiC) curriculum, Education for Sustainability (EfS), GLOBE, Education and the Environment Initiative (EEI), Seed to Soup Curriculum
Cycles	Matter cycles through all living systems (e.g. water, geochemical) without producing a steady stream of unused waste; one's waste is another's food; local cycles interact with regional and global cycles.	Composting, Recycling, Rain barrel catchment, Xeriscaping
Solar Energy and Flows	The sun fuels most ecological systems on earth; every transfer of energy results in some energy loss, thus energy needs are ongoing.	Geothermal energy, Solar panels, Daylighting, Solar tubes, Wind Generator - Wind to Schools
Dynamic Balance	Feedback loops help maintain a relatively steady state with continuous fluctuations between upper and lower boundaries	School vegetable gardens that provide produce for classrooms, lunches and families in need, FEED program

Nested Systems	Every living system is itself an integrated whole and at the same time part of a larger system; change at one level affects the other levels.	Student-led teams in a school, School and District Green Teams, Diffusion from school initiative to district or city initiative, Participation in the U.S. Healthier Schools Challenge, Changes in the school lunch program affecting students, staff and the community

Table 2 lists the democratic principles, definition of the principle, and examples of the evidence from the ED-GRS applications (McKey & Kensler, 2016).

Table 2
Evidence of Democratic Principles in ED-GRS Award Winners, 2012–2014

Democratic Principle	Definition	Examples of evidence from ED-GRS award applications
Choice	When each person is encouraged to exercise their right to choose between a diversity of possibilities	Student, staff, parent, teacher choice, After-school exercise opportunities for students and staff, Healthy snacks, salad bar, Farm to School Problem-based Learning/Project-based Learning, Outdoor classrooms
Purpose & Vision	When an organization and the individual know their reason for existing and have a sense of intentional direction	Vision Statements, Leaders who construct processes for co-creation of a shared vision, FOX Code
Individual & Collective	When individuals understand the unique contribution they make toward achieving collective goals	Several Participants involved in application process, HiP (I can make a Healthy Planet) HEROS (Helpful Energy Resource Officers (Flagstone – Douglas Cty), Service Learning Projects, "Theme Immersion," daily instruction uses the physical design and interactive exhibits to convey environmental elements. (Munford), Valuing student interest and inquiry
Accountability	When each person and the organization as a whole is responsible to each other and their community for	EPA IAQ, Tools for Schools Student-led initiatives or events that impact a larger community, Energy Star Rating – EPA Portfolio Manager, Utility Manager, PowerEd - McKinstry, SEE

Democratic Principle	Definition	Examples of evidence from ED-GRS award applications
	their actions	(Schools for Energy Efficiency), National Energy Education Program (NEED)
Dialogue & Listening	When we listen and engage in conversation in a way that brings out new levels of meaning and connection	Community Planning or engagement that impact decision-making (ex: Chicago Conservation Corp), Safe Routes to Schools, Working with partners in creating curriculum and student experiences (e.g. Hawaii Prep Academy)
Reflection and Evaluation	When there is careful and thorough consideration and feedback regarding previous actions, events, or decision	Evaluation plan (ex: G & H school program – seven earth-friendly pathways, Environmental education frameworks that include reflection and evaluation, Energy Improvement Plan (Loveland, OH), Changed internal policies (ex: Miller Park, Omaha, NE)
Integrity	When each person steadfastly adheres to high moral principles	Goals, Expectations promoting integrity (Ex: IB Learner Profile), Policies, PBIS – Positive Behavior Intervention Strategies
Fairness and Dignity	When each person is treated justly and regarded impartially	Anti-Bullying Programs, Sylacauga Alliance for Family Enhancement (SAFE), Employee and Student Recognition Programs, Student Health & Wellness Programs (ex: IMPACT, Miller Park)
Decentralization	When power is appropriately shared among people at all levels of the organization	Shared Leadership, Student-led initiatives (e.g. Aquaculture research facilities, Recycling Program Farmer's Market)
Transparency	When ideas flow freely and information is openly and responsibly shared	Goals are shared and easily identifiable to all stakeholders, QHS Professional Learning Communities (Quincy), Natural Step – Systems-Thinking

The ED-WSS framework is comprised of underlying principles that may drive practice in diverse ways. Kensler, Caskie, Barber, & White (2009) showed a strong correlation between teachers' perceived practices of democratic principles (democratic community) and their report of their own continuous learning. This study utilized the ED-WSS in creating a survey to measure teacher perceptions of the practice of ecological and democratic principles in their ED-GRS schools and to find out if there is a relationship between ecological and democratic principles in these schools according to the evidence reported by teachers. The structure of the ED-GRS

application did not directly reflect the practice of these principles. Therefore, using this framework as an analysis tool allowed me to both test and possibly extend the ED-WSS framework as well as gain a deeper understanding of how educators across the U.S. are presenting their practice of green schools.

Literature Review

The ED-GRS award program has had four years of schools, school districts and post-secondary winners.   However, the published literature on this newly created award is still in its infancy. As of the end of 2015, there have been three published articles focused on the ED-GRS. One of the articles assessed the ED-GRS schools' integration of sustainability education (Warner & Elser, 2014), another surveyed school leaders about their insights on the award (Sterrett, Imig & Moore, 2014), and the third article explored the three pillars of the ED-GRS (Sterrett & Imig, 2015).   These three studies represent the initial body of research on the ED-GRS program, as of this writing. Beginning here sets the stage for describing the growing body of literature related to whole school sustainability.

Warner and Elser (2014) reviewed the 2012 ED-GRS applications. Through their analysis they created a new metric, "interconnectedness". Warner and Elser argued that "interconnectedness" must exist among the projects for the projects to be sustained over time. They offered in their research that "a school must be interconnected to its community to allow students to develop an understanding on complex problems "(Warner & Elser, 2014, p. 5). This idea of connecting to the community to sustain green school practices is also suggested in Sterrett, Imig and Moore's (2014) article, and Sterrett and Imig's (2015) article. These studies complement my work in digging deep into three years of the ED-GRS applications and analyzing to what extent these applications reflect ecological and democratic principles (Kensler, 2012).

Sterrett, Imig and Moore (2014) surveyed ED-GRS award winning school leaders from 2012–2014. They concluded that being labeled a "disadvantage school" wasn't a barrier to implementing green school practices or winning the ED-GRS award. Sterrett et al. also addressed the importance of the organization of a green team that included both students and staff; this was further supported in their follow-up study from 2015 (Sterrett & Imig). Green teams were listed as one of Sterrett and Imig's eight strategies for school leaders to consider when implementing green school practices. They also concluded that students and teachers were identified as being the most imperative to the sustainability efforts. Eighty-five percent of the participants stated that the quality of teaching and learning improved or significantly improved since receiving the award. Lastly they reported that student engagement displayed 90% improvement by the participants and community engagement presented that 77% indicated improvement.

Sterrett and Imig followed up with 12 of the schools from their 2014 study. The purpose of their study was to provide useful examples of school sustainability practices through the lens of the three pillars of the ED-GRS. Three of the key findings in their study suggested: aligning green school practices within the daily curriculum, sharing the message with all stakeholders, and the creation of outdoor learning gardens. These key findings also support Warner and Elser's (2014) research on "interconnectedness" and its importance in sustaining green school practices.

All three of these ED-GRS articles are pivotal in creating support for the ED-GRS award and whole school sustainability. They have set the groundwork for other researchers, practitioners, and school leaders to begin or continue implementing green school practices in moving their schools to becoming healthy, high performance schools. This quantitative study is focused on teacher perceptions of ED-WSS in their ED-GRS award winning school as well as examining the data to understand how these principles are related to one another. This expansion of the published research includes survey data from teachers and how this data of ED-WSS principles correlate to one another in suggesting that both ecological and democratic principles need to be present simultaneously to sustain the practices of the ED-GRS framework.

For the purpose of the paper, the term 'ED-GRS' refers to schools that have received the recognition award from the U.S. Department of Education and these are the focus of our study. In addition, the term 'ED-WSS' refers to the Ecological Democracy for Whole School Sustainability framework as this is the theoretical framework used for this study. This study will move beyond these ED-GRS articles and focus on the teachers in these schools and their perceptions of ED-WSS.

Methods

This section documents the actions taken and describes the research design, the sample, instrumentation, data collection, data analysis and limitations in this study. As outlined in the introduction, this quantitative study was designed to investigate teacher perceptions of the practice of ecological and democratic principles (ED-WSS) in ED-GRS award winning schools. This study further examines ED-GRS winning schools in an effort to understand if schools are sustaining the implemented practices. This study focused on the perceptions of teachers in these schools; previous studies (Sterrett & Imig, 2015; Sterrett, Imig & Moore, 2014) were focused on educational leaders. In addition, this study digs deeper into the ED-WSS framework allowing me to examine relationships between the ED-GRS framework and the ecological and democratic principles. This research will provide school and district leaders not only with examples of practices related to the ED-GRS three pillars, but support the need to implement democratic principles in an attempt to sustain green school practices.

Research Design

This was a descriptive and correlational quantitative study (Johnson, 2001). Descriptive statistics were used to inform the audience of the ecological and democratic principles perceived by the ED-GRS teachers in the study. In addition, I used a correlational research design as this study is non-experimental research where I have only one group and two or more variables. "Correlational research involves collecting data in order to determine whether and to what degree, a relationship exists between two or more quantifiable variables" (Gay & Airasian, 2000, p. 321). An online survey was created and used to gather teacher perceptions about the practice of the ED-WSS framework in their school.

The use of Qualtrics was appropriate for collecting the survey data from the ED-GRS teachers because it is user-friendly, ease of availability, and teachers could take at their convenience. I

developed two research questions that outlined the framework for analyzing ED-GRS teacher perceptions of ecological and democratic principles in their schools.

Research Questions

This study was designed to address the following question regarding ecological and democratic principles in schools that received the ED-GRS award during the first three years of the award.

1. To what extent do teachers from ED-GRS 2012, 2013, and 2014 report evidence of the practice of ecological and democratic principles?

2. To what extent is there a relationship between teacher perceptions of ecological principles and democratic principles in ED-GRS 2012, 2013, and 2014 schools?

Sample

Due to the infancy of the ED-GRS award program, it was necessary to survey all 190 schools that received the award in 2012, 2013, and 2014. Each of the ED-GRS principals received a phone call requesting that his/her teachers participate in the survey. I followed up the phone call with an email to the principal with directions to forward to his/her teachers. The email asked the participants to complete a brief anonymous survey to report their perceptions of organizational processes and systems in their school. Participants represented the 190 ED-GRS schools awarded in 2012, 2013 and 2014.

Sampling Method

Phone numbers and email addresses for the ED-GRS Principals was made available on the publicly accessible ED-GRS applications located on the U.S. Department of Education website for those schools receiving the award in 2012, 2013, and 2014. Of the 190 applications, 10% of the applications didn't list the principal or head of school on the application packet. In addition, 40% of the principals or head of schools had turned over as of the fall of 2015. I had to research via the web and call several schools to find the name of the principal. My goal was to contact all 190 ED-GRS principals to obtain their permission for their teachers to participate; I was able to get in contact with 178 via phone and/or email. I struggled to get directly in contact with the principals. I had to leave voice messages and messages with front desk personnel or the office manager. Even though I followed up every message with an email, I only received confirmation to participate from 34% of the 190 principals whereas 31% didn't respond at all. Thirty of the principals that stated they would participate didn't have any teachers complete the survey. My data set consists of 34 schools and 359 teacher surveys. Using an online survey via email may have initially saved time and money; there were issues that may have presented obstacles including emails lost or caught in spam or junk folders.

Instrument and Data Collection Method

The survey included 55 questions across two sections. The questions focused on the practice of ecological and democratic principles. There were fixed answer questions, open-ended questions

and Likert-type questions. The following six-point scale was used for the Likert-type questions: Never (1), Very Rarely (2), Rarely (3), Occasionally (4), Frequently (5), Very Frequently (6). Section 1 of the survey tool was created from the ED-GRS framework and the ecological principles (Capra 1996, 2002) to measure teacher perceptions of the practices of ecological principles in their school. I created this survey tool for this study as there wasn't any survey tool already created focusing on ecological principles. An expert panel was convened to help with the creation of this survey tool, including initial feedback on survey questions, design, and distribution. The panel included Auburn University professors with expertise in the ED-GRS framework, LEED (Leadership in Energy and Environmental Design), survey design, and an understanding of sustainability. In addition, a pilot study was conducted which included surveying 30 educational leaders, teachers, and professors. Participants answered questions that reflected the three pillars of the ED-GRS framework and related to the practices of each of the six ecological principles in their school. The six ecological principles are development, network, partnerships and diversity, dynamic balance, nested systems, cycles, and solar energy and flows. The three pillars of the ED-GRS framework focus on reducing environmental impact and costs, improving the health and wellness of students and staff, and providing effective environmental and sustainability education.

Table 3
Sample Survey Questions – Section 1: Ecological Principles

Pillar 1 2 3	Sample Survey Questions Organized by Ecological Principle
	Development
* * *	Teachers have the opportunity to participate substantially in designing new change initiatives at my school.
* *	Our school building's form and function is explicitly visible and taught to occupants.
	Networks, Partnerships, & Diversity
* *	Our school involves local businesses and/or community organizations in the building design, renovation and/or management.
* *	Our students learn about food webs through studying the species that live on and near our school property.
	Dynamic Balance
* * *	Our students learn through interdisciplinary lessons, problems, and/or projects about the dynamic relationships among nature, the built environment, and human well-being through studying our school community (landscape, building and occupants).
	Nested Systems
*	Our students learn how to evaluate complex situations (grade-level appropriate) from different

		perspectives.
*	*	The following features of our building clearly integrate it into the surrounding landscapes: Mark all that apply
		Abundant natural light in the building, constructed wetlands, garden(s), green roof, native plants, rainwater management, solar panels, other, and don't know
	Cycles/Energy and Flows	
	*	Our school promotes health and wellness through one or more of the following at my school: Mark all that apply
		Banned sales of high sugar drinks, daily physical activity, fresh fruit and vegetable options at lunch, healthy snacks, high quality indoor air quality, natural lighting, outside play or unstructured time, other and don't know
*	*	Students at my school use our building to learn about one or more of the following: Mark all that apply
		Daylighting, energy use, geothermal power, green roofs, indoor air quality, natural building materials, solar panels, water management, other and don't know

The second section of the survey tool was the WorldBlu School Survey. Previous work by Kensler (2009) supported the reliability of this survey tool in Pennsylvania public schools. Kensler used the survey to measure teacher perceptions of democratic principles in action at the individual, positional leader, and organizational levels (Kensler, Caskie, Barber & White, 2009). Participants answered 37 questions that related to the practices of the 10 democratic principles in their Green Ribbon School; approximately three to five questions per principle. The ten democratic principles are fairness and dignity, purpose and vision, integrity, reflection and evaluation, accountability, individual and collective, dialogue and listening, decentralization, transparency and choice.

Table 4
Sample Survey Questions – Section 2: Democratic Principles

Sample Survey Questions Organized by Democratic Principle
Fairness and Dignity
I am encouraged to be respectful of others views and opinions, even if they differ from mine.
Purpose and Vision
My school's administrators set strategic priorities in order to live our school's values, achieve its vision, and fulfill its purpose.
Integrity

Systems and processes are in place that provide ethical checks and balances for my school and protect it from fraud.

Reflection and Evaluation

I am encouraged to develop myself through training, coaching and/or mentoring.

Accountability

Systems and processes are in place that bring a balanced approach to my school's accountability, not just a singular focus on test scores.

Individual and Collective

My school's administrators encourage me to express my individuality while still being responsible to the purpose and values of the school.

Dialogue and Listening

Systems and processes are in place that allow everyone to take the appropriate amount of time to dialogue and listen to ideas and suggestions.

Decentralization

I am encouraged to take risks regardless of my title or rank.

Transparency

Systems and processes are in place to keep me informed about my school's overall performance

Choice

My school's administrators appropriately encourage me to make choices.

Data Analysis

The survey data was downloaded from Qualtrics to IBM Statistical Package for the Social Sciences (SPSS) for Windows version 23.0 (IBM SPSS Inc. 2015), then the data was aggregated by school providing an overall mean score for each of the questions per school not per teacher that took the survey as the number of surveys per school were inconsistent. This was to create usable mean scores that would most accurately reflect each of the ED-GRS schools that participated in the survey. The questions were then organized by the principles of the ED-WSS. This organization of questions is explained in Tables 3 and 4 above. The final data set included overall mean scores of the ED-WSS for each of the 34 schools, an overall mean score for ecological principles, and an overall mean score for democratic principles. Pearson correlations determined if there were relationships between the overall ecological mean and the overall democratic mean as well as relationships between the individual principles of the ED-WSS.

Limitations

There are limitations to conducting an online survey. One needs to make the following assumptions: participants are willing to participate and honest in completing the survey. In addition, I chose to survey teachers from the entire population of ED-GRS award winners. There were 190 schools in the United States that were awarded from 2012–2014. More than 40% of the principals or head of schools had turned over as of the fall of 2015. Principal turnover is limitation of the survey as it was difficult to know who to contact as well as the buy-in for a new principal to participate in a survey that they were unaware of the ED-GRS award and the application process. In addition, schools also may have had teacher turnover since being awarded.

Results

This section will answer the two research questions: (1) To what extent do teachers from ED-GRS 2012, 2013, and 2014 report evidence of the practice of ecological and democratic principles? and (2) To what extent is there a relationship between teacher perceptions of ecological principles and democratic principles in ED-GRS 2012, 2013, and 2014 schools? To answer the first question, I provide a descriptive overview of the teacher perceptions of ecological and democratic principles reported in the online survey that was conducted. I then present an analysis of the correlations between ecological and democratic principles of the ED-WSS framework.

Table 5 represents the mean scores for each of the principles of the ED-WSS. Teachers were asked three to five questions that directly related to each of the principles. The questions that pertained to cycles, solar energy and flows were multiple answer questions; teachers were able to mark all that applied. They received a score up to 6; based on the number of practices that they marked. The other questions were answered with a Likert-Type scale with 1 representing never and 6 representing very frequently. Per Table 5, under ecological principles cycles, solar energy and flows had the highest score of 5.09; indicating that teachers perceived this principle most frequently in their ED-GRS school. Nested systems score a 4.76 and networks, partnerships, and diversity scored a 4.51; both scores reflect that teachers report evidence of these principles frequently. Development and dynamic balance scored 4.30 and 4.29 respectively; indicating that teachers perceived these principles occasionally at their ED-GRS school.

Table 5

Phase 2 – Teacher Perceptions of ED-WSS in ED-GRS Award Winners, 2012–2014

Ecological Principle	Mean Score out of 6	Democratic Principle	Mean Score out of 6
Cycles, solar energy and flows	5.09	Integrity	5.35
Nested systems	4.76	Accountability	5.34

Networks, partnerships and diversity	4.51	Fairness and dignity	5.25
Development	4.30	Purpose and vision	4.92
Dynamic balance	4.29	Choice	4.90
		Transparency	4.85
		Dialogue and listening	4.82
		Reflection and evaluation	4.80
		Individual and collective	4.77
		Decentralization	4.60

According to the data, looking at democratic principles, integrity scored a 5.35, accountability scored a 5.34, and fairness and dignity scored a 5.25 which indicated that teachers perceived these principles most frequently in their ED-GRS school. Purpose and vision, choice, transparency, dialogue and listening, and reflection and evaluation, scored between 4.80 and 4.92; teachers perceived these principles more often than individual and collective and decentralization, but less often than integrity, accountability, and fairness and dignity.

The mean scores for the ecological and democratic principles were averaged to create an overall mean score for each set of principles. The democratic mean score was higher at 4.95 or very closely related to frequently; ecological principles had an overall mean score of 4.59 or half-way between occasionally and frequently on the Likert-type scale. The standard deviations were .55 and .43 respectively for ecological and democratic principles. I ran a Pearson correlation to determine if there was a relationship between the ecological and democratic principles overall. The Pearson correlation revealed a .36 correlation. This statistic is used to measure the strength and direction of the linear relationship, or correlation between two factors. The value of r can range from -1.0 to +1.0. This correlation is a positive value which indicates that the values of two factors changed in the same direction. As the values of one factor increases, values of the second factor also increase; as the values of one factor decrease, values of the second factor also decrease. The closer the r value is to +1 the stronger the correlation, a score of .36 represents a correlation; a medium or moderate correlation (Green & Salkind, 2011).

Ecological and democratic principles were shown to have a medium positive correlation. I then executed correlations for the individual principles to find out if relationships existed between them. Table 6 represents the correlations between the principles of the ED-WSS. For this study, cycles were combined with solar energy and flows thus the sixteen principles are grouped into

fifteen principles. The results of the correlational analyses presented in Table 6 show that 63 out of the 105 correlations were statistically significant and were greater than or equal to .34. Purpose and vision was correlated to all of the principles except for networks, partnerships and diversity, and nested systems; they were statistically significant and were greater than or equal to .34. Choice was also correlated to twelve of the principles except for nested systems and cycles, solar energy and flows; they were statistically significant and were greater than or equal to .40. The correlations of nested systems, networks, partnerships and diversity, and cycles, solar energy and flows with the other principles tended to be lower and not significant. Nested systems showed a relationship with cycles, solar energy and flows at .54; which is statistically significant at the .01 level. However, nested systems didn't correlate as statistically significant with any other ecological principles or democratic principles.

Focused only on the democratic principles, the results suggest that 45 of the 45 correlations were statistically significant at the .01 level and were greater than or equal to .45. The most highly correlated democratic principles were accountability and integrity at .91, reflection and evaluation and individual and collective at .86, dialogue and listening and choice at .82, and choice and decentralization at .80. The most highly correlated ecological principles were development and dynamic balance at .70, development and networks, partnerships, and diversity at .70, development and choice at .65, and development and purpose and vision at .62. All of the most highly correlated principles listed above were statistically significant at .01. They were also greater than or equal to .62 which represents a large correlation.