Inquiry-Based Learning: The Vehicle for Promoting Education for Sustainable Development in

Elementary Schools

A Thesis Submitted to

the College of Graduate and Postdoctoral Studies

in Partial Fulfillment of the Requirements for the

Degree of Master of Education

in the Department of Educational Foundations

University of Saskatchewan

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ABSTRACT

Education for Sustainable Development (ESD) has risen to prominence over the past decade and several studies have been conducted regarding its significance. UNESCO has repeatedly elevated children as crucial to achievement of the goals of the Decade for Education for Sustainable Development (DESD) and research affirms that children are critical in galvanizing the changes necessary for achieving sustainable lifestyles. A plethora of research has been undertaken to analyze the integration of ESD into high school and post-secondary education, while other studies have featured the integration of ESD into specific disciplines. However, the literature does demonstrate there have been few studies that investigate the integration of ESD in elementary school classrooms

Three research questions were used to navigate this research. These research questions include: (i) Does the Saskatchewan mandated curricula in English Language Arts, Mathematics, Social Studies and Science at grades 6, support Education for Sustainable Development through inquiry-based learning? (ii) If so, does this mandated curriculum support primary school teachers who are committed to ESD and who use inquiry approaches? (iii) What are the barriers/challenges faced by Saskatchewan teachers who are committed to implementing ESD through IBL.

Findings from this research indicates that inquiry-based learning is a compatible teaching method for fostering ESD in the classroom. However, the study revealed that while some ESD concepts are embedded in the documents, the curricula lack adequate ESD visibility, which contributes to the challenges that teachers experience when integrating ESD in the classroom. Such deficiencies, along with other challenges uncovered by this research, impede the teachers' willingness to integrate ESD in their classroom. These findings are critical for educational policy

makers and curriculum developers as these suggest ways in which ESD through inquiry-based learning could be strengthened.

Keywords: Sustainability, Sustainable Development, Education for Sustainable Development, Decade of Education for Sustainable Development.

ACKNOWLDGEMENTS

Foremost I would like to thank God for the strength, knowledge, wisdom and understanding throughout writing this paper. He connected me with the right persons at the right time that provided assistance and constructive feedback, hence the successful completion of this paper.

I must express my sincere gratitude to my supervisor, Dr. Lynn Lemisko. You agreed to be my supervisor after I decided to transfer from a course-based masters to a thesis-based masters. You always gave me a listening ear and provided assistance which repositioned me on the road when at times I was driving on the soft shoulders. I appreciate you feedback as well as taking the time to see how I was doing, and always reminding me to take care of myself during this process. I must say these kind gestures have not gone unnoticed.

To Dr. Janet McVittie, member of my committee, and provided the second eye next to my supervisor, I must also say thanks for your valuable feedback. Those questions asked caused me to rethink and re-evaluate my thought process. I am grateful. Besides Dr. McVittie, I would like to also acknowledge the other members of my committer, Dr. Jeff Baker for agree to be my external assessor and Dr. Shaun Murphy for being the committee chair for my thesis defense.

Sincere thanks must also be extended to John Boakye-Danquah. I really appreciate your time, assistance and valuable feedback you gave me. You never said no, and for this I am truly appreciative.

Chris Clark, thanks for allowing me to use your network and the contact in reaching out to participants that fit my criteria for recruitment of participants. Your help in this manner helped to reduce the stress along the way. Additionally, appreciation must be extended to the participants who were willing to be involved in the study. Thanks for time and for sharing your thoughts which

provided rich data for my research. Without your willingness to participate I would still be struggling, and this research would not be a success.

Thanks to my family, church family and friends your constant encouragement, support and prayers which provided strength along the journey especially when I felt discouraged.

To you all I am appreciative and eternally grateful.

DEDICATION

I dedicate this thesis to my father.

Your passing was sudden and still leaves a lingering void, but I thank God I had you as a father. You thought us your children the value of hard work and persistency, and I can say it has paid off. I will forever remain humble and grounded keeping your memories close. I won't be able to tell you that I have successfully completely my journey of writing my thesis. But I know of a certain what you would have said and done, and that you would be proud of me.

Gone but not forgotten

Valentine Small (passed: January 19, 2018)

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LIST OF ABBREVIATIONS

BAL   Broad Areas of Learning

CEE   Council for Environmental Education

CCES   Creative Change Educational Solutions

DESD   Decade of Education for Sustainable Development

ELA   English Language Arts

ESD   Education for Sustainable Development

UNESCO   United Nations Educational, Scientific and Cultural Organization

IBL   Inquiry-Based Learning

SD   Sustainable Development

WSSD   World Summit on Sustainable Development

CHAPTER ONE: INQUIRY-BASED LEARNING: THE VEHICLE FOR PROMOTING EDUCATION FOR SUSTAINABLE DEVELOPMENT IN ELEMENTARY SCHOOLS

1. Introduction

We are living in a time of great technological innovations which cumulatively have led to a powerful insight on the discoveries and utilization of earth's resources. This has led to improvements in human standard of living and economic growth, which has resulted in the integration of nations through globalization. However, therein lies a paradox, as we are also living in a precarious time because the protection of the earth's resources is continuously traded off for economic growth. Suzuki (2010) posited that "since human imagination and inventiveness are limitless, economists believe that there are no barriers to constant expansion of the economy" (p. 46); hence the environment is invariably stripped without thought for the survival of future generations. As Dickens (1859) wrote in his book, *A Tale of Two Cities*, we are indeed living in the best of times and the worst of times.

The deterioration of the environment, in general, is not only threatening its natural resources but also our existence. Human populations are on the rise, demanding more land, water, and food. Modernization has given rise to an increase in industrialization, and thus increased pollution (Roberts, 1996). Moreover, ecosystems are changing adversely from what they used to be, while governments and environmentalists are at odds about where to mine, how much to fish and where to clear. Scientific data and research have all attributed the increase in global temperatures to human activities and our use of the earth's resources (Oreskes, 2004; McMichael, Woodruff & Hales, 2006).

Such diverse ecological problems can only be solved if governments, companies, and communities engage in authentic and ingenious sustainability practices. Sustainability has

generated much conversation regarding the protection of the environment to ensure that adverse human actions are curtailed while positive attitudes and behaviors are promoted to create and instigate the necessary change towards a sustainable future. UNESCO has promoted Education for Sustainable Development (ESD) as a viable, coherent and integrated response to the environment scourge that humanity has created. The UN advances that this form of education needs to be prominent at all levels of the educational ladder. The UN at the World Summit on Sustainable Development in Johannesburg (2002) endorsed ESD as a means to "to advance and strengthen the interdependent and mutually reinforcing pillars of sustainable development-economic development, social development and environmental protection-at the local, national, regional and global levels" (Benavot, 2014, p. 4). Bhandari and Abe (2003) in reference to the Creative Change Educational Solutions (CCES), a non-profit group in the United States also affirmed that:

> ESD is an approach to teaching and learning that meets the challenge of balancing the three "E's" and intergenerational equity. It is a lifelong process of gaining the knowledge, skills and values needed to create lasting economic prosperity, environmental health, and social justice. (p. 23)

The growth-oriented charter of economic development, however, is reflective of the neoliberal capitalist regime which views the earth's natural resources as assets to be utilized for human benefits. This growth-oriented charter prompts globalization and political corruption which has led to the over-use, depletion, and degradation of the environment, being myopic of the fact that environmental care is the "precondition for decent human life" (Mensah & Castro, 2004, p. 5). Sustainability, according to Taylor, Quinn and Eames (2015) seeks to enforce an equitable use of earth's resources, and the creation and use of "alternative energy sources, better waste disposal and recycling techniques" (p, 2). These combined with improved technological development will complement continued economic growth while simultaneously fostering

environmental protection. Erekson, Loucks and Strafford (1999) advised that sustainability should be seen as "a system whereby economic growth and/or improvement in the quality of life occurs in unified system that is complementary with, rather than antagonistic with, natural capital" (p. 2). Taylor et al. (2015) in recognizing the anthropocentric (human-centered) nature of sustainability clarified sustainability to refocus sustainability towards "more ecocentric outlook that values nature for its own sake" (p. 2). Hence, sustainability requires a reduction in our demand on nature to supply human needs, thus not seeing nature solely as capital, which has contributed to the over-use and exploitation of the earth's natural resources.

1.1 Sustainable Development and the Elementary Student

I believe that our students, especially at the elementary level need to become more interconnected with their environment to create the changes needed for environmental protection and sustainability. Additionally, I believe such interconnectedness will engender a passion in students to uncovering real-world solutions for the problems around them. Megan (2017, para. 5) argued that "people are only interested in sustainability if they are educated about it, and if it's overall importance is effectively communicated." Hence, students need to understand their roles and responsibilities as they relate to the issue of sustainability. From my experience at the primary level in the Jamaican setting, many schools do try to foster environmental awareness through environmental clubs, which cater to a small percentage of the school population, who have an inclination towards the protection of their environment. These clubs foster environmental literacy among students and much time is spent on students becoming knowledgeable about their surroundings. The questions that reside in my mind are: Are students acquiring the necessary information to heighten environmental awareness? Is this knowledge sufficient to advance a change

in their cultural values? Cultural values can deter changes in thinking about the environment that are compatible with setting the standards for "sensitivity, knowledge, skills, attitudes and values, personal investment and responsibility, and active involvement" (Disinger & Roth, 1992, p. 5). The curriculum is therefore important because it provides a uniform structure and approach where education for sustainable development can be incorporated in the various subjects to foster the attitudinal and behavioral changes in students. The curriculum also heightens students thinking capacity building through various activities which elevate students to become critical, consider the pros and cons of their actions; as well as to pursue their aspirations along the path of sustainable development towards careers that promote human and environmental well-being.

Therefore, the goal of sustainability should also go further to call for a change in people's behaviors and attitudes. Through education for sustainable development, it places emphasis on the learner in four categories: the reflective and deep thinker, ethical and responsible citizen, the connected learner, and the autonomous learner (Gough & Sharpley, 2005). With these emphases, our students could be equipped with the knowledge they could use to speak intelligently concerning environmental issues, demonstrate acceptable pro-environmental behaviors in their communities, and act with moral autonomy. Thus, students can see themselves as agents of change, and make a difference in providing solutions for environmental problems that surround them.

As an educator, I believe that schools are the medium through which a nation transmits its culture, values and behaviors and where knowledge is disseminated and learned. If we are to preserve the earth, then our culture, values, and behaviors must be reassessed and retaught to galvanize positions that foster respect for and sustainable use of the earth's resources. Hence, I believe in the need for education for sustainable development (hereafter, ESD) in schools, particularly at the primary/elementary level, which is critical for a reorientation in attitudes and

behaviors to take place. I posit that elementary education is the starting place where the foundations for self-advancement, development, and social justice are laid, and these are the pre-requisites for sustainable development. Thus, I argue that elementary education is the best stage for the adaptation of sustainable attitudes and behaviors towards the environment. In this thesis, according to the Saskatchewan context, "primary/elementary" education extends from kindergarten to about grade 8 (ages 4 to 14 years). In Jamaica, the term "primary education" refers to kindergarten to grade 6 (ages 6-12 years). Thus, when I refer to Jamaica, I use the term "primary" education, and in Saskatchewan, use the term "primary/elementary" education.

1.2 Compatibility between Pedagogy and Education for Sustainable Development in the Classroom

In the Jamaican Primary Schools' curriculum, aspects of environmental education are integrated through Social Studies and Science. Here, students are introduced to concepts of resources and the impact of human activities on climate, but this curriculum lacks the depth and meaningful connections which would engender change in behaviors and attitudes. The adherence to a curriculum that is geared towards test taking I believe does impede behavioral and attitudinal changes towards the environment, which is a core product of ESD.

On the other hand, inquiry-based learning is a pedagogical approach which fosters deep-learning; learning, that is, where students become absorbed and fascinated, engaged and involved and where connections and important understanding are attained. Inquiry-based learning has undergone research scrutiny which has found it to be an effective classroom pedagogy that is amassing momentum due to its student-led learning focus. Because of this, inquiry-based learning has now been "included in disciplines with a sustainability focus" (Pretorius, Lombard & Khotoo, 2016, p. 168). According to Barron and Darling-Hammond (2008), several studies have concluded

that inquiry-based learning engages students in the teaching-learning process in a more personal manner, so that learning becomes more "authentic," making it easier for retention because knowledge is gained through real-world experiences and employed to solve real-world problems.

In the Social Studies curriculum in Jamaica, I have taught topics such as "How do we use the environment to satisfy our needs? How do we affect the environment as we meet our economic needs in (a) agriculture, (b) tourism, (c) mining, (d) manufacturing trade? How do we preserve our environment while meeting our economic needs"? These three topics embody the three components of ESD, that is, social (culture), economics and environment. I have utilized both the conventional teacher-centered mode, as well as the question-based learning approach that is associated with inquiry-based learning. I have concluded that the latter is superior because my students were learning about these topics in non-linear ways, which from my observations, made them more enthusiastic and participatory. My students formulated numerous questions which generated new problem-questions in the process which resulted in teamwork, as students started working together to find solutions for the questions they asked. This process, I believe, provided my students with more comprehensive, deeper learning which I think can be utilized as an ecological approach to learning. Inquiry-based learning brings students more into context with what is being taught. It fosters relationships and enables complexity, and I saw my students become interrogative of solutions given, and unwilling to take them at face value. I reflected on this pedagogical approach and have theorized that it is an excellent accompaniment to ESD in the classroom because it appears to promote that deep, reflective thinking that results in changes in attitudes and behaviors, which, in effect, create that symbiotic relationship between ESD and inquiry-based learning.

Admittedly, integrating inquiry into the classroom can be a challenge for teachers, because we have timelines when specific topics should be completed as we prepare students for national and internal examinations. Teachers are scrutinized more and have to provide greater

accountability especially in locations, where test scores set the benchmark for the appraisal of teacher performance. The common complaint about employing inquiry as an instructional pedagogy is that it can be time-consuming. Additionally, there are reservations among teachers as shared by Taylor, et al. (2015) who declared that "evidence suggests that primary teachers are generally concerned about sustainability issues and acknowledged lack of understanding of how to teach for sustainability and the perceived constraints emanating from current curriculum priorities commonly inhibit education for sustainable development from being developed in many classrooms" (p. 1). Teachers are not resistant to this being taught in the classroom, but they want to be fully equipped with the knowledge and necessary pedagogical approach that will help them be more efficient and confident. Hence, I believe that our schools' curricula need to be restructured, away from the dominant domain of education for qualification, to education that embodies, in equal proportion, the domains of "qualification, socialization and subjectification" (Biesta, 2015).

1.3 Education for Qualification versus Education for Sustainable Development

Benavot (2014) in adopting the definition of primary education from the ISCED 2011 highlighted the importance of this level of education. He posited that primary education provides "learning and educational activities typically designed to provide students with fundamental skills in reading, writing and mathematics (i.e., literacy and numeracy), and to establish a sound foundation for learning and solid understanding of core areas of knowledge and personal development, preparing for lower secondary education. It aims at learning at a basic level of complexity with little if any specialization" (p. 5). I would future extend on this definition to incorporate Biesta (2015) general view on education which he argues should prepare students with the necessary skill sets, knowledge and disposition necessary to sustain them in the future.

Socialization consists of the means by which the norms, values, and beliefs of a country are transmitted to its citizens. This is accomplished through curriculum content, co-curricular activities, and interaction of students with teachers and their peers. Emphasizing subjectification in education will bring students into the knowledge of becoming persons who care. Students will learn to take responsibility for their actions towards the environment, to think critically and to ask those problematic questions while probing for answers regarding the environment. I believe that encouraging exploration, inquisitiveness, and dialogue for questioning will engender problem-solving. This will forge and fortify our students with the requisite knowledge for the future. Through subjectification, students will possess the mindset to follow pathways that endorse sustainable careers, which are in alignment with the goals of sustainability. These domains are all connected with education for sustainable development which "is a life-wide and lifelong endeavor which challenges individuals, institutions and societies to view tomorrow as a day that belongs to all of us, or it will not belong to anyone" (United Nations Decade of Education for Sustainable Development 2005–2014).

I am an advocate of Orr's (1990) perspective on education, where he posited a rethinking of education to encapsulate, "all education as environmental education" (p. 242). Education should serve the purpose of teaching students that they are a part of the natural world which inevitably will guide their actions towards sustainability. Hence, inquiry integrated to promote sustainability through ESD, will assist students to develop the understandings needed to comprehend and navigate through the complexity of the world in which they reside and, to possess the knowledge, critical thinking skills, values, and capacity to participate in decision making about environmental and developmental issues.

It has been proposed that education, should bring about change in the thought process and attitude. But what kinds of change in thoughts and attitudes are needed? Neoliberalism has

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reoriented the world, and hence our schools as David Orr stated in Kevany (2007), "schools in America [and in general have] turn[ed] out the best kind of planetary vandals," who see the world solely for its resources (p. 109). The care and protection of the environment need to be carried on by our children. Therefore, I believe in the importance of ESD which teaches stewardship to students. Through observations of children in their surroundings, I have come to realize that most are not cognizant of the importance of their environment, nor, are they aware of their role, in caring for the health of their surroundings. ESD articulates stewardship which immerses our students deeply into community life where they get to understand how their choices and actions impact others and, thereby, learn to "anticipate, calculate, and minimize their impact on the Earth (Kevany, 2007, p. 114). Children gaining an appreciation for the environment cannot learn this merely during contact teaching time. Instead, gaining an appreciation, entails children spending time in the outdoors conducting their investigations and making meaningful connections with nature. This, I believe, will generate and cultivate more positive attitudes and behaviors provided the right pedagogy is employed and adequate amount of time is allocated for such learning and engagements.

1.4 Environmental Consciousness and Education for Sustainable Development

Awareness is the front-runner for appreciation and consciousness which is what ESD does offer to our students. The transmission of environmental consciousness is vital for students, as this aids in giving rise to pro-environmental behaviors, which in turn embodies other psychological constructs such as beliefs, values, attitudes, knowledge, and others as shown in diagram 1.

Figure 1. 1 Dimensions of environmental consciousness
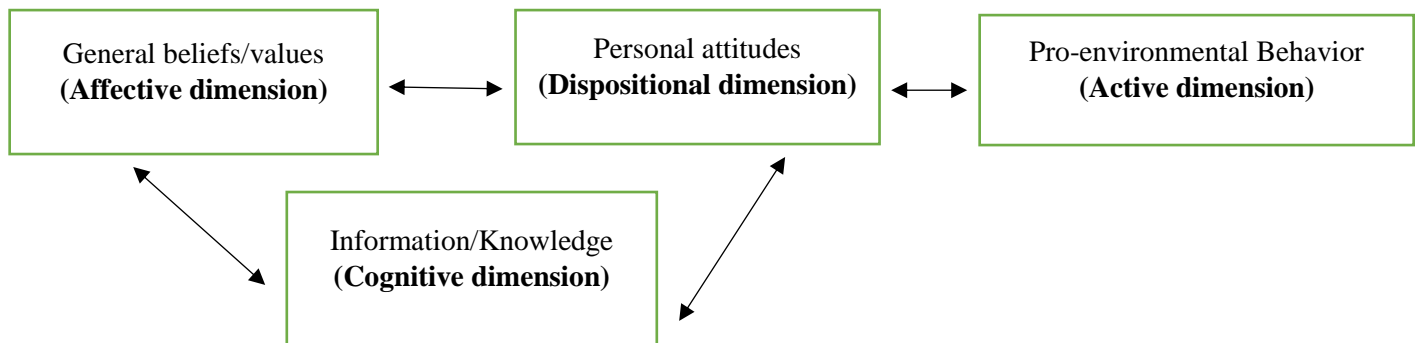
(Lafuente & Sánchez, 2010, p. 738)

Beliefs and values serve as the conduit through which pro-environmental behaviors are operationalized. An individual's belief is that understanding that is held as truth which matures into their values. Values serve as standards which dictate actions and decisions held by a person. Therefore, pro-environmental attitudes can stem from our perception towards one's ecological responsibility which Lafuente and Sánchez (2010, p. 738) explained can "reinforced or mitigated certain attitudes" as well as "encourage or discourage the extension of pro-environmental involvement to other behaviours" (p. 738). Lafuente and Sánchez (2010) further expounded that a person's knowledge about the environment and their belief and attitudes go hand-in-hand. It is important to note that human's responsiveness about the environments can be heightened through specific values and attitude, it is equally valid that acquiring new information refashion these values and attitudes.

I, therefore, argue that ESD through inquiry learning can engender such changes because of the direct personal experience with the environment that it presents to students through various student-led activities. These activities can range from excursions on the school grounds extending

into their local communities, to visiting factories, garbage disposal sites, other ecological sites, and various other ecosystems, as well as being engaged in other activities that will enhance the health of students, their communities, and the environment. I posit that these first-hand, hands-on experiences will enable students to gain appreciation from different perspectives, thereby, aiding students in making the link between knowledge gained in the classroom and the environmental realities that persist. This will, in my mind, generate high levels of environmental consciousness and activate environmental proactivity, whereby students even at a tender age will become involved in sustainable practices at the local level, setting the foundation for continued "endorsement of a pro-environmental worldview" (Lafuente & Sánchez, 2010, p. 735). Such level of environmental consciousness needs to be cultivated among our students to place all-hands-on-deck as we partner in striving for a more equitable and sustainable future.

For my first degree in Jamaica, I pursued a Bachelor of Science in Environmental Studies which gave me firsthand experience about the importance of the earth's natural resources. I learned how our interaction with these resources has led to exploitation and pollution which have left humanity in a precarious position. I returned to my school but realized that environmental education still ascribed to the old rhetoric of the 3rs for environmental protection: reduce, reuse, and recycle. I wanted to learn more about sustainability and how I can make this cross-curricular at the elementary level. The master's program offered at the University of Saskatchewan through the Department of Educational Foundations, under the thematic area of Critical Environmental Education, provides this opportunity. I believe this course of study will provide me with the requisite knowledge and skills which I can utilize in my personal life. The knowledge gleaned will further equip me as an educator and help to make my students more conscious of their environment and the role that each must play in its preservation. After coming to Saskatchewan, I realized that there are several environmental programs that are engaging students with their environment

through inquiry approaches. I became intrigued about the use of inquiry-based learning to promote ESD in Saskatchewan elementary schools. This gave rise to the following questions for the research to undertaken: (i) Does the Saskatchewan mandated curricula in English Language Arts, Mathematics, Social Studies and Science at grades 6, support Education for Sustainable Development through inquiry-based learning? (ii) If so, does this mandated curriculum support primary school teachers who are committed to ESD and who use inquiry approaches? (iii) What are the barriers/challenges faced by Saskatchewan teachers who are committed to implementing ESD through IBL. These questions are important in providing answers to the vast expanse of queries that arise from ESD being used in the classroom. My questions seek to narrow the focus to students, teachers, and the curriculum in Saskatchewan to deepen understanding about how ESD might be better situated as a discipline, to be integrated into the classroom.

Education for Sustainable Development provides a viable means by which sustainability can be integrated into the elementary curriculum. This has been endorsed by the government authorities in Australia and New Zealand deeming ESD as salient for achieving a sustainable future by starting with our young children. The Australian Government through a publication- Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools in 2005, stated that:

> Environmental education for sustainability involves approaches to teaching and learning that integrate goals for conservation, social justice, cultural diversity, appropriate development and democracy into a vision and a mission of personal and social change. This involves developing the kinds of civic values and skills that empower all citizens to be leaders in the transition to a sustainable future. (p. 13)

I argue that creating a sustainable future cannot be achieved through "political agreement, financial incentives or technological solutions" (UNESCO, 2015) on their own. Instead, I posit that creating a sustainable future requires a change in individual attitudes and behaviors. All citizens have a role to play in the call for sustainability. So, too, do our elementary children who must be given opportunities to develop the necessary knowledge, skills, attitudes, and values required to create a sustainable future.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The world as we know it has evolved and we presently live in a consumer society which has given birth to the exploitation of natural resources, global warming, climate change, industrialization, and capitalism. These have significantly morphed the world and the earth on which we live. Mounting concerns about the degradation of the environment and developmental problems have marshaled the call for a new thrust for preservation through sustainability. Sustainability encompasses a structure for balance between our needs for societies to advance economically but within the realm of protecting the environment in which we live. Sustainability transcends environmental care to embody environmental laws for the protection of people, land, and animals. Sustainability involves examining the long-term impact of human actions on our environment and finding plausible ways to minimize the effects.

Traditionally, the environment was defined as everything around us (Felice, Giordan & Souchon, 1985). Our surroundings include all those things that we depend on for survival, whether directly or indirectly. This definition has undergone numerous changes to its meaning over several decades and has been revised to include "man-made environment as well as the political, economic, cultural and social environment" (Anyolo, 2015, p. 7). Reddy (2008) gave a clear description of the four constituents of the environment:

- Biophysical: refers to the natural environment including living organisms and non-living organisms such as air, soil, and water.

- Social: concerns the interaction between people in their communities and daily lives.

- Economy: involves jobs, money and the exploitation of resources.

- Political: is linked to issues of power, policy, and decisions. (p. 2)

These four components of the environment give a broader view of their inter-relatedness. Anyolo (2015) further elucidated these as being holistic where the "natural systems that provide the environmental resources, the social systems in which people live together, the economic systems that provide jobs and income to the people, and the political system in which people make political decisions in using the natural environment" (p. 8). Humans are a part of the environment, and there are interactions and inter-relationship between the different variables. Hence, the environment needs to be preserved and protected, as it is the bedrock from which our needs are met.

People recognize that current economic trends and development pose a threat to the different ecosystems and their well-being. There is a growing sense of consciousness that sustainability is the way forward which is accomplished through education (McKeown, Hopkins, Rizi, & Chrystalbridge, 2002). The call has now positioned education to be used as the medium through which the message of sustainability can be transmitted engagingly and holistically to students where germination for change can start. Tomas (2009) asserted that Education for Sustainable Development (ESD) is the response through education which incorporates sustainability into curricula, enlightening and empowering students. Huckle (2006) further added that:

> [ESD] is characterized by six features. It is interdisciplinary and holistic; values-driven;
>
> encourages critical thinking and problem-solving; uses a wide range of methods,
>
> media, and activities; fosters participatory decision-making; and addresses local as
>
> well as global issues using the language(s) which learners most commonly use" (n.p).

ESD is a form of education that inculcates the interconnectedness of each component of the environment in a manner where the goals of sustainability for communities, and the society can be

transmitted to students. ESD is also observed as an approach to teaching that reorients education to one that is more learner-centered, interactive, and value-based. Thus, education for sustainable development is a "collaboration of content and pedagogy that engages individuals in a study of the environment to encourage them to take positive actions towards it in an attempt to ensure sustainability for their societies" (Anyolo, 2015, p. 2). For this paper, the focus is centered on the content of ESD to cultivate among students, responsible environmental actions and attitudes as well as encouraging them to find solutions for the increasing environmental problems that we currently face. Despite this call and numerous studies that have provided conclusive evidence of its effectiveness (Tomas, 2009; McKeown et al., 2002), ESD, which is critical for reorientation in attitude and behavior to take place. Many educational jurisdictions do not have ESD as a mandatory part of school curricula.

The world today requires learners that are critical thinkers, innovators, learners that are cognizant of "what to do with information, that is, how to analyze it; make sense of its abundance and complexity; cooperate with others to synthesize information, and communicate the results. Consequently, quality education is no longer based primarily on fact acquisition" (Laurie, Nonoyama-Tarumi, Mckeown, & Hopkins, 2016, p.227). Inquiry-based learning (IBL) incorporates these and allows the learner to investigate issues, find solutions and even evaluate environmental actions on issues (Blackmore, Reynolds, Ison & Lane, 2015). Panasan and Nuangchalerm (2010) also assert that inquiry-based learning gives students the opportunity to become scientists in their own rights by developing a keen scientific sense towards knowledge and understanding towards the natural world. Additionally, IBL also challenges traditional pedagogical techniques and can "lead students [to] open their windows of opportunities to explore and understand about the natural world by themselves" (Panasan &, Nuangchalerm, 2010, p. 253). ESD and IBL have been researched as separate entities but not in unison as an effective medium for

teaching and promoting sustainability in education. Thus, there is a gap in understanding how inquiry in the classroom could be used as an approach to ESD.

This literature review will seek to provide useful information on both inquiry and ESD in the classroom while attempting to ascertain how inquiry as a learning technique might foster environmental sustainability in school. Through my literature review I will determine if there have been studies that address the following issues (i) Does the Saskatchewan mandated curricula in English Language Arts, Mathematics, Social Studies and Science at grades 6, support Education for Sustainable Development through inquiry-based learning? (ii) Does this mandated curriculum support primary school teachers who are committed to ESD and who use inquiry approaches? (iii) What are the barriers/challenges faced by Saskatchewan teachers who are committed to implementing ESD through IBL.

2.1.1 Historical Overview of Education for Sustainable Development

Unrestricted human development and exploitation of resources now threaten the health and safety of many of our resources, socially and environmentally. Sustainable Development (SD) has become a requirement of progress, rather than a choice. Hence development must be redefined as that which "meet[s] the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission Environment and Development, 1987, p. 48). Achieving a sustainable future will demand a change in our mental framework to adopting lifestyles that are "ecologically, economically, socially, culturally, and personally more sustainable" (Taylor, Quinn & Eames, 2015, p.1). Sustainability endorses high quality of life through mutual equilibrium among the different pillars upon which it rests. The concept of sustainability according to Gough and Sharpley (2005) underscored the economic, social and political factors that can promote or impede a society towards environmental protection. Gough and Sharpley (2005, p. 4) further

opined that sustainability "also seeks to promote stewardship of the environment, encouraging everyone to assume the responsibility of being." Sustainability can, therefore, be summarized as a long-term goal towards achieving that high quality of life through eco-centric priorities and dictates. Such changes can be channeled through education, especially of our children to affect attitudinal and behavioral changes that are requisites for a sustainable future. One such type of education that advocates this type of sustainability in schools is the education for sustainable development.

Sustainable Development (SD) gained recognition from the 1987 Brundtland Report which sought to bring awareness for convergence between economic development, social progress, and environmental concerns. Bhandari and Abe (2003) provided a detailed characterization of sustainable development which adds depth to the discussion to underscore its difference from that of sustainability. Sustainable Development as argued by Bhandari and Abe (2003) provides:

- an enlarged view of development that extends beyond simple measures of "growth". It raises quality of life (happiness, satisfaction, secured and descent life, fair, equitable and accessible).

- living in a way to create lasting economic prosperity, environmental health, and social justice for current and future generations.

- long-term thinking with a commitment to social equity and fair distribution of benefits and costs, both geographically and across current and future generations.

- a means [by which0 humans would enjoy a secured, decent quality of life, and that has a fair, equitable access to the Earth's resources (p. 17).

Sustainable Development creates a paradigm shift and response in thinking and response in consideration of limits to which our natural resources can be utilized, as well as the challenges that encountered to ensure equity to a decent quality of life and equal access to the resources of the earth. Sustainable Development, therefore, presents a trajectory or a process to attain a high standard of living as offered through the dynamics of sustainability. The end result of SD is only achievable through a comprehensive shift of human's values and ethical standards to redirect our choices and actions to become more adaptive of more sustainable behaviours. Actualization of the Brundtland Report diminishes from being mere rhetoric to exhibit dynamism to where each generation becomes mindful of their use and consumption of the earth's resources to meet their needs without jeopardizing future generations' ability to have equal access to meet their needs.

Education provides the resources and tools to transform the SD agenda into reality. Education grants "the motivation, justification, and social support" (Bhandari & Abe, 2003, p. 56) for the attainment of the SD agenda. Education for Sustainable Development as captured by the document Agenda 21, from the Rio Earth Summit articulates a form of learning where the long-term scope and consideration of the interrelationship of the economic, environment and society dimension of SD can be brought into the classroom. The Brundtland Report formalized SD as the overarching framework which would guide all future development and the Johannesburg World Summit on Sustainable Development (WSSD) in 2002, further strengthened the tenets of SD. This led to the proposal of the summit of the Decade of Education for Sustainable Development (DESD) which concluded that sustainable development cognition is embedded in education (UNESCO, 2005, International Implementation Scheme). Anyolo (2015, p. 1) in reference to the UNESCO (2009) stated that "education for sustainable development aims at raising public awareness of the concept of sustainable development so as to develop enlighten[ment], active and responsible citizens locally, regionally and internationally."

Education for Sustainable Development (ESD) is bound by the principles and values of SD - environment, society, and economy. ESD according to the Council for Environmental Education (CEE, 1998, p. 3) is defined as:

> [That which] enables people to develop the knowledge, values, and skills to participate in decisions about the way we do things individually and collectively, both globally and locally that will improve the quality of life now and without damaging the planet for the future.

Education for sustainable development is that which aids individuals to make informed, sustainable decisions about developmental activities that will protect the integrity of their environment in sustaining and maintaining life at its highest quality. Thus, the need for its implementation in the classroom especially at the primary/elementary level.

Emphasis has always been placed on higher education to respond to the environmental challenges that we face. Bezbatchenko (2010, p. 2) in reference to the Association of University Leaders for a Sustainable Future (ULSF), which is comprised of over 350 universities, stated that: "We believe that the success of higher education in the 21st century will be judged by our ability to put forward a bold agenda that makes sustainability and the environment a cornerstone of academic practice" (Report and Declaration of the Presidents Conference, 1990). Universities are given the responsibility of not only disseminating the concept of "sustainability" but must produce individuals possessing the expertise to execute the conceptual framework of the goals of sustainability. Universities are also directed to conduct research, develop policies to be integrated into communities to enhance the creation of an equitable and sustainable future. However, waiting to educate people at the post-secondary level is too late.

Children at the primary level should be seen as equal participants, in ESD so they can be knowledgeable about this at an early age. As Rowe (2002) articulated, we want to "empower our students to help create a better society instead of making them passive" (p. 2). Children at the elementary level can make the connection between knowledge, and enthusiasm to prevent environmental degradation, and can contribute to building a healthy future for their communities and the planet. Orr (1992, p.101) posited that this form of "education will foster a sense of connectedness and ecological citizenship, and will provide the competence to act on such knowledge" to produce agents of change. Elementary students, as agents of change, are set on a trajectory through education where they become engaged in finding solutions for environmental problems that we face. Global concerns and sustainability are topical issues and are even now more pertinent to the lives of children and for the future. Children are not exempted from, nor are they oblivious to current happenings. Instead, as Bourne, Hunt and Blum (2016) asserted, children are being informed by the electronic media and the internet, which aids in forming their perspectives about the world and the environment. The questions that arise are whether schools should be responsible for educating children about these global and sustainability trends? (Bourne et al., 2016). An affirmative answer in this regard then seeks to determine the answer for the following question: then what kind of knowledge, skills, values, and attitudes must be developed by our children? These questions underscore the importance of primary education in the equation, as education towards sustainability issues are now inevitable for children who are the future generation.

It is significant that changes be made in the curriculum, to demonstrate a commitment to transforming elementary students, to become thinkers, and instigators to effect change. Education for Sustainable Development could be the mobilizing force that could take on the ecological dilemma that the world is currently facing. ESD is designed around a student-led learning pedagogy

that fosters curiosity and encourages learning where students build their understanding, through explorations and observations. Bourn et al. (2016, p. 8) are of the view that "rather than just being informed about the environment and the wider world, children need to be supported in both understanding and experiencing them." Therefore, it is important that the primary curriculum is structured to address environmental issues through ESD that will benefit students and the nation at large. ESD, as affirmed by Benavot (2014, p. 6), results in "fundamental behavior and attitudinal changes which "should have meaningful 'spillover' effects on society and the economy." Benavot (2014) outlined why ESD should be taught at the primary level, as he posits that:

> When students learn about sustainable development through ESD, they are introduced to relevant content themes and knowledge topics. Learning for sustainable development means that students learn about the need for fundamental change: how one might rethink current policies, practices, and programs in light of sustainability criteria. Learning as sustainable development entails learning processes and experiences that result in the promotion of real change in the community. (p. 6)

Education for Sustainable Development is a mobilizing agent that transforms students' lives, whereby students become sensitive to the need for fundamental changes in their communities and their lifestyle. Through a curriculum that facilitates ESD, students will learn to become facilitators of sustainable practices. As students become aware of various ecosystems and how these systems influence human well-being, students are more able to consider notions of reciprocity, which incorporates balance and mutual exchange. It is important that students at the elementary level "consider the appropriateness of how they relate with nature and with others, including the actions and habits conducive to a good life, both meaningful and satisfying" (Chan, Balvanera & Benessaiah, 2016, p. 1).

2.1.2 Focus of Education for Sustainable Development

Considering the environmental dilemma that we face concerning future development, ESD should be a fundamental course of studies that is implemented in schools, including primary schools. Education for Sustainable Development embraces the tenet of providing students with the necessary knowledge, skills, understanding, and attitudes needed to sustain them without compromising the environmental, social, and economic well-being, now and for the future (Kemp & Bellingham, 2014). Kemp and Bellingham (2014) posited that ESD in schools would encourage students to:

- consider what the concept of global citizenship means in the context of their own discipline and in their future professional and personal lives

- consider what the concept of environmental stewardship means in the context of their own discipline and in their future professional and personal lives

- think about issues of social justice, ethics and wellbeing, and how these relate to ecological and economic factors

- develop a future-facing outlook; learning to think about the consequences of actions, and how systems and societies can be adapted to ensure sustainable futures. (p. 5)

Education for Sustainable Development empowers citizens and students as environmental stewards possessing the requisite knowledge, skills, and values to ground sustainable behavior, environmentally feasible activities, civic responsibility and better-quality lifestyle (Armstrong, 2011). Armstrong further explained that ESD fosters the preparation for lifelong learners, as well as producing learners with an adaptable quality which is critical in a time when societies are being subjected to metamorphism socially, environmentally, and economically. This is affirmed by Laurie et al. (2016) research on ESD in schools:

ESD helps prepare our students for a sustainable future by ensuring that they are environmentally responsible, globally aware, economically astute, socially responsible, and technologically proficient citizens who are capable of coping with the emerging challenges and opportunities, we are facing now and will continue to face in the future. (p.11)

Education for sustainable development aids students in being proactive thinkers, in that students, learn to contemplate current and emergent and future situations. Students developing their critical thinking skills equally enhance their problem-solving skills as they are provided with the opportunities to find solutions for environmental problems that exist, in their communities and by extension the world. ESD builds students' capacity to face complex real-world issues through the practice of collaboration and discussions and trial and error. The more practice students are afforded, the more confident they become of their capabilities to find answers for environmental problems which exists to become active participants in society to secure a sustainable future. ESD is considered useful in generating students' self-reflection in pondering their learning, which has the effect of stimulating changes in values, attitudes, and behaviors. Such values include respect, empathy, cooperation and social justice (Murray & Murray, 2007). ESD can be utilized in the primary schools as a bottom-up approach to affect changes to sustainable development, and which would produce the link between children, and their natural and social environment. This engenders the shift from the teacher-centered, regurgitated facts to participatory "authentic" (Barron & Darling-Hammond, 2008) learning which molds students into critical thinkers, and thus to make good decisions.

The Institute of Global Environmental Strategies (2003) posits that the nature of ESD makes it interdisciplinary which was corroborated by Laurie et al. (2016). Their study revealed that this content is "interdisciplinary and cross-curricular work" (Laurie et al., 2016, p. 235) and is not

confined to one particular discipline. Education traditionally is compartmentalized, whereby subjects are taught as discrete disciplines and students are unable to make the necessary connection. The sustainable development agenda calls for curriculum and learning to be interdisciplinary, which ESD presents as a workable framework of how this can be developed and achieved in the curriculum (Weller, 2015). The interdisciplinary nature of ESD though seems to be surrounded by controversy and difficulty (Weller, 2015). Education for Sustainable Development becomes difficult for integration when taught from the traditional disciplinary framework. ESD taught from an interdisciplinary focus requires time which teachers affirm is not enough to achieve the goals and outcomes of the curriculum. ESD integrated among the different disciplines allows for clarity in understanding the connection between the three pillars of SD. Barnett (1997), also added that this contributes to whole learning experiences which engender students to become "critical beings" (Barnett, 1997) in the world. Critical beings as argued by Barnett (1997) entails persons being "more than just critical thinkers. They are able critically to engage with the world and with themselves as well as with knowledge" (p, 1).

Education for Sustainable Development also provides the opportunity for learning to move beyond the traditional confinement of the classroom to the outdoors and into the students' communities. Such dynamism in learning helps to ground learning in the learners' lived experiences which promotes and foster connectivity and a sense of place. According to Ontong and Grange (2015), "a sense of place is critical in developing an emotional connection with the land and establishing an environmentally conscious and responsible citizenry" (p. 45). Thus, students get to understand the intricate interlinkage between the ecological, social, economic, political and even cultural relationships in their surroundings.

Sustainability is interwoven into the fabric of social justice. One cannot be achieved outside the concerted effort of the three dimensions of SD. Social justice as explained by Balaceanu, Apostol and Penu (2012) is a "moral and political construction aimed at equal rights and collective solidarity, advocating for a more just society, assured by the redistribution of wealth, and realize its perpetual state of injustice" (p. 678). Benavot (2014) outlined several issues associated with the three dimensions of sustainability but also added another dimension of culture. He mentioned that these dimensions include:

> Good governance, gender equity, health and HIV & AIDs, reproductive health, peace/conflict, human rights, access to education, human trafficking, drug addiction (Social); cultural heritage, cultural preservation, indigenous knowledge (Cultural); urbanization, poverty, food security, rural development (Economic); and climate change, fresh water, energy/natural resources, air pollution, desertification, environmental conservation, biodiversity, natural disasters (Environmental) (pg. 5).

ESD, therefore, seeks to redefine sustainability through a social justice lens which inculcates and changes values and attitudes, as well as advocates for equal rights and access to the Earth's resources and comparable access to the benefits to be attained from social progress.

Figure 2. 1 Features of Education for Sustainable Development
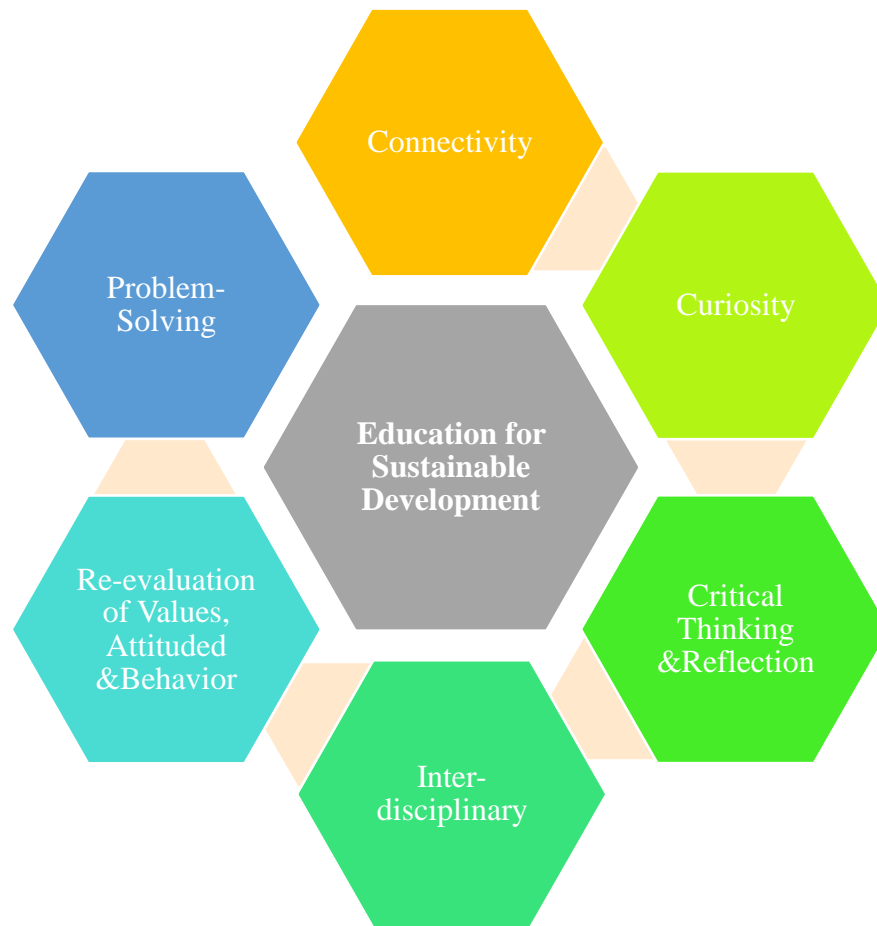
The diagram above provides a summative view of the different features of ESD. Education for Sustainable Development promotes connectivity to the environment through curiosity and investigation which makes learning more meaningful. The interdisciplinary nature of ESD enables students to be reflective, thinking outside the box, thereby to formulate feasible solutions to solve problems faced by individual and collective means. Lastly, ESD challenge students and clarifies values to engender sustainable changes in their values and attitudes.

2.1.3 Education for Sustainable Development and Indigenous Knowledge

Education for Sustainable Development in reorienting education is dynamic and presents a pedagogical shift from the teacher, passive form of leaving to one that is active and student-led

thereby promoting change on values, attitude and behavior. In order to solve the environmental debacle that we currently face, there is growing consensus that indigenous ways of knowledge combined with ESD provide a robust and unified approach towards the actualization of the balance of the different dimensions of sustainable development. Indigenous ways of knowing presents a framework of living in harmony with the land. Magni (2017) outlined that indigenous knowledge calls for:

> Respect for nature and its conservation as well as community-based management of lands and natural resources are central to the indigenous ideas of well-being. Natural resources are not marketable, and the community is the pillar around which indigenous peoples organize their lives (p. 14)

Such respect for nature and land further increasing the path towards attaining a sustainable future. Indigenous knowledge adds immense value to education in that it teaches invaluable lessons of respect, balance and holism. Such attributes aid in the development of sustainable attitudes and behaviours.

2.1.4 Inquiry-Based Learning

Education for Sustainable Development is an active, student-led approach to education to create transformation in students' values, attitudes and behaviour. The effectiveness of ESD requires a comparable pedagogical approach that will stimulate and advance its features as demonstrated in Figure 2 in the classroom. Inquiry-based learning based on the literature reviewed provides this catalysis towards ESD.

Inquiry-Based Learning is a student-led approach to learning where they become actively involved in deciphering issues and formulating questions related to a curricular or concept.

Maxwell, Lambeth, and Cox (2015, p.3) defined IBL "as a system of learning that supports the development of students' problem solving and critical thinking skills, which is crucial for them in everyday activities." Students are capable of being analytic toward what they need to learn to solve problems and to generate meaningful and practical solutions to solve problems. Justice, Rice, Roy, Hudspith, and Jenkins (2009, p. 843) further asserted that IBL could move students from the initial stage of curiosity to be regular investigators, using this inquisitiveness as a motivator to learn from "personal engagement." Miller, McNeal, and Herbert (2010) further added that this pedagogical approach to learning, allows students to comprehend the world better as they learn about it, thereby reinforcing and strengthen connectivity with their surroundings. Friesen and Scott (2013), in reference to the Galileo Educational Network Association (2008) recreated a rubric with a checklist of the key functional characteristics of inquiry:

- The inquiry study is authentic in that it emanates from a question, problem, issue, or exploration that is significant to the disciplines and connects students to the world beyond the school.

- Students are given opportunities to create products or culminating work that contributes to the building of new knowledge.

- Assignments or activities foster in-depth knowledge and understanding.

- Ongoing formative assessment loops are woven into the design of the inquiry study and involve detailed descriptive feedback.

- The study requires students to observe and interact with exemplars and expertise, including professionals in the field, drawn from the disciplinary field under study.

- Students are given the opportunity to communicate their ideas and insights in powerful ways through a myriad of media.

- Students' final products of communication through public presentations and exhibitions (p. 15)

IBL, therefore, elevates students to become better learners and lifelong learners. The above justifies IBL plausibility to be used to drive ESD.

Conversely, some scholars Moreno 2004, Chall (2000) and Kirschner, Sweller, and Clark (2006) argued that inquiry is an ineffective learning pedagogy which provides minimal guidance instructions which could avail students to be at risk. They posit that students learn best from more guided instructions especially, for novice learners thereby allowing better storage of information. However, Hmelo-Silver, Duncan, and Chinn, (2007) countered such claims, to posit that inquiry not only results in meaningful learning experiences but also provides with scaffolding opportunities that promote reflection (Davis & Linn, 2000) and deeper understanding. Additionally, Zhang et al. (2005) highlighted some impediments that schools encounter in implementing inquiry in the classroom. These include instructional support, class size, and teacher professional development. Schwandt (1994) also made an extraordinary claim in favour of inquiry, "to understand the world, one must interpret it, to interpret it, one must construct meaning" (p. 118). This meaning becomes practical through inquiry-based learning, as student learn best from concrete activities, where they can manipulate and actively be involved in the learning process. Thus, this type of student-led learning can be achieved through place-based learning which adds meaning to learning which makes it quality education.

2.2 Theoretical Considerations

IBL and ESD both embody the constructivist epistemology, where students are engaged in cognition based on their experiences and thoughts (Shareef, 2010). Constructivism applies the "central principles [whereby] learners can only make sense of new situations concerning their

existing understanding. Learning involves an active process by which learners construct meaning by linking new ideas with, their existing knowledge." (Naylor & Keogh, 1999, p.93). Therefore, the learner's previous knowledge and experience are pivotal in assisting in the construction of new knowledge (Ültanir, 2012) and deeper understanding (Armstrong, 2011). The constructivist approach to learning incites a shift from "knowledge as a product to knowing as a process" (Jones &Brader-Araje, 2002, p. 3) where the learner becomes actively involved in the learning process. The constructivist approach makes learning more progressive, as it becomes more student-led where the teacher becomes the facilitator, encouraging students to be reflective, formulating their questions and finding solutions for real-world problems. Thus, the students are no longer just passive receptors of knowledge. Additionally, the constructivist approach presents a framework which promotes relevancy of subject-matter whereby students can attain personal meaning-making (Armstrong, 2011) as their perspectives are challenged, thereby reconstructing importance. This form of relevancy is important for students to deal with the challenges of sustainability.

Both IBL and ESD reflect concepts such as learner engagement (Armstrong, 2011), deep learning (Warburton, 2003), and social interaction (Kuklthau, Maniotes & Caspari, 2007; Armstrong, 2011). These concepts all emphasize the ability of both ESD and inquiry to bring the elementary learner to experience the inter-relation between themselves and the world in which they live. From a theoretical perspective, Hmelo-Silver et al. (2007) put forward the claim, that the constructivist theories of learning influence inquiry. Palinscar (1998) in agreement articulated that children learn by "constructing their own knowledge" (p.100). Additionally, Alexandar and Poyyamoli (2010, p. 3) in referencing Piaget (1970) reaffirmed that "learners construct knowledge by physically and mentally acting on objects or phenomena in the environment." Therefore, constructivism is best suited for this research as it supports the specific content that ESD seeks to impart to students to elicit sustainable attitudinal and behavioral changes to effect actions towards

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a sustainable future. This coincides well with IBL as a robust pedagogical approach to teacher and learning when a particular knowledge is to be constructed; inquiry provides the guidance to monitor such a construction, and to make suggestions if students are going off track. Students do have choices and some control in the inquiry process hence, will they tend to be more engaged. The topics that constitute ESD are centered on local issues, which have relevance to their lives, they will become engaged in a better sense through IBL.

2.3 Inquiry-Based Learning and Education for Sustainable Development.

Incorporating inquiry and ESD into the classroom has not been easy (Wee, Shepardson, & Fast, 2007; Zhang et al., 2005). However, the amalgamation of both for students at the primary level puts forward a dynamic and innovative way to equip these students with the knowledge and skills towards environmental protection, helping them to become socially and ecologically conscious citizens. Tilbury (2011, p. 29), suggested that ESD encourages students to "ask critical reflective questions, clarify values, envision more positive futures, think systematically, respond through applied learning, and explore the dialectic between tradition and innovation." Inquiry is an educational approach like education for sustainable development that promotes curiosity in students which foster exploration and more profound understanding (Justice et al., 2009). This teaching method is not confined to the classroom and hence brings students through an exploration of their environment, thereby fostering good global citizens. Laurie et, al (2016) based on their study on ESD conducted in 11 countries concluded that it makes the curriculum more vibrant and exciting as students can engage in topics that increase their self- awareness and morphs them to become lifelong learners. Inquiry fosters deep learning (Sawyer, 2006) which allows students to interrogate issues, thereby formulating logical arguments towards problem-solving. This is also mirrored by ESD which brings students into a better understanding and awareness of their

environment and local issues. This engagement affords students opportunities to formulate solutions towards a sustainable future.

The global environmental predicament that we currently face calls for elementary students to make a tangible contribution towards the goals of sustainability. ESD and Inquiry both have essential roles to play in this endeavor. Pretorius et al. (2016) highlight the fact that, "learning experiences need to be tailored to fit circumstances in different places and contexts and to empower students to address environmental issues" (p. 168). Such learning experiences are offered by both ESD and inquiry-based learning which deviate from the conventional teacher methodology to one that is student-led which nurtures high order intellectual and critical thinking skills (Hudspith & Jenkins 2001; Wals, 2011). The inquiry approach to learning as purported by Wals (2011) develops lifelong-learners that experience learning through personal engagement. This form of engagement cultivates within students, pro-environmental attitudes and values such as "humility, fairness, open-mindedness, respect, empathy, compassion [as well as] teamwork [and] collaboration" (Alberta Education, 2010, p. 5-6). This is reflective of ESD as Armstrong (2011) emphasizes results in the growth of citizens with the requisite skills and values that will promote a better quality of life. Cumulatively, these are dimensions of quality education. Quality education as defined by UNESCO (2004, p. 17) possess the following underlying principles:

> Two principles characterize most attempts to define quality in education: the first identifies learners' cognitive development as the major explicit objective of all education systems. Accordingly, the success with which systems achieve this is one indicator of their quality. The second emphasizes education's role in promoting values and attitudes of responsible citizenship and in nurturing creative and emotional development.

These similarities provide supportive arguments that advance their use in primary schools to enhance sustainability in the primary curriculum.

Australia and New Zealand have provided us with a possible framework for the primary restructuring curriculum to reflect education for sustainability. Their curricula designed to promote education for sustainability, showcases replicable examples that teachers can utilize to remedy the deficiencies that exist for teaching ESD at the primary level "in order to promote knowledge of, positive attitudes towards and suitable action for sustainability in relevant, meaningful, enjoyable and creative ways" (Taylor et al., 2015, p. x). Taylor et al. (2015) in citing the Australian Department of the Environment (2009), stated that in Australia, for example, the program seeks to accomplish the following goals:

- Learning and teaching for sustainability as an integral component of school curricula;

- Schools actively engaged in a continuous cycle of planning, implementing and reviewing their approach to sustainability as part of their everyday operations;

- Schools using natural resources, including energy, water, waste and biodiversity, in more sustainable ways;

- Schools and school authorities reporting on changes towards sustainability;

- Young people sharing ownership of sustainability initiatives and decision-making;

- Schools working towards sustainability in partnership with their local communities;

- Schools and school authorities implementing governance practices that support effective environmental education for sustainability;

- Individuals supported to make effective sustainability decisions and choices; and

- Schools and communities developing values that support a sustainability ethos. (p. 6)

I think that this guide if it is fostered through the conduit of inquiry-based learning, could provide a suitable approach that will generate strong reinforcement for ESD in schools.

2.3.1 Inquiry and Environmental Stewardship

Stewardship refers to the care or supervision of something. Gough and Sharpley (2005, p. 27) presented a broader perspective to the meaning of stewardship, expanding its meaning to include the "responsibility of being a caretaker or custodian of the environment by managing activities with due respect for the health of that environment. It means taking care of what we have not only for ourselves, but also for those who come after us." By learning to connect with nature, students learn to respect, protect, understand, and appreciate the natural world. This can be accomplished through ESD by way of inquiry. Gough (2005), likewise, concurs that ESD will engender collaboration and cooperation in working towards improving the quality of life. Students will learn how the different components of the environment interconnect and operate at their maximum in tandem to human care. This is accomplished when students are removed from the four walls of the classroom and are immersed in their surroundings to explore and investigate, which provides the experiential learning through inquiry, which fosters environmental stewardship. Through inquiry, pupils can be brought to an understanding of the importance of their actions about their environment, such as garbage disposal, conservation, and community life which affect the environment. The premise of this literature review is to fill the gap in studies as it relates to this aspect of stewardship, inquiry and primary students.

2.3.2 Inquiry and Environmental Consciousness

Sustainability should engender environmental consciousness among its recipients. Nazir and Pedretti (2016) in their research concluded that environmental consciousness appreciates when people get connected with their environment, and care for their surroundings and institute programs that will operate for the protection of the environment. Nazir and Pedretti (2016) researched the Faraway Dale Outdoor Education Centre as a case study to determine the strategies needed to assist

the progress of consciousness raising. The study demonstrated that educators share similar opinions about "preference[s] for using strategies that provide people with deeply engaging experiences with and in the outdoors" (p.298). These preferences deviate from the traditional methodology of teaching, where learning is centered on a textbook. In this way, reform is introduced to the teaching-learning process. ESD promotes education that educates the whole student, which is holistic, thereby establishing them on a path that is, "balance, connected and inclusive relationship with the world" (Nazir & Pedretti, 2016, p. 290). Nazir and Pedretti, (2016, p. 290) in referring to Miller (2007) and Capra 1997 stated that, "an aspect of holistic education is to bring students to an awareness of nature's wholeness and their place in it, aligning with what some refer to as teaching the principles of deep ecology."

As the name suggests, IBL takes students on an investigatory and exploratory path to discover things for themselves. According to the National Science Board (1991) "students are likely to begin to understand the natural world if they work directly with natural phenomena, using their senses to observe and using instruments to extend the power of their senses" (p. 27). This form of inquisitiveness that inquiry facilitates can aid a sense of consciousness among students, thereby strengthening synergy with ESD to promote environmental consciousness among students.

2.4 Barriers to the Implementation of Education for Sustainable Development through Inquiry-Based Learning in the Classroom

The integration of Education for Sustainable Development in the primary curriculum is pivotal for students to play their part in the movement towards sustainable development. The comprehensive approach of ESD makes it superb for transmission of sustainable development through the primary/elementary curriculum. There are, however, several barriers and challenges which impedes the implementation of ESD through the inquiry pedagogical approach. Anyolo

(2015, p, 42) provided evidence which shows that "research [has] identified lack of time as one of the major barriers to the effective teaching of ESD." Teachers are constrained by obligations of the curriculum, which prevents the practical and hands-on experience to be fulfilled through the content of ESD. Compulsory adherence to the rigid timetable of the curriculum prevents outdoor activities that prevent the cultivation of critical thinking and problem-solving skills (Anyolo, 2015). Such time constraints impinge on curriculum innovation, and thus inevitably hinders the effective assimilation of ESD into the curriculum.

Some other barriers that challenge the integration of ESD in the curriculum that are related to the deficiency in knowledge and skills, as well as the inadequacy of resources include teachers' knowledge, skills, and resources (Summers, Childs & Corney, 2005). This was confirmed by Anyolo (2015), based on research findings, including that teachers do have some misunderstanding about what sustainability entails. Such misunderstanding has resulted in teachers having trouble in conveying the goals of education for sustainable development in the classroom. Summers et al. (2005, p. 337) in citing Hart and Nolan (1999), stated that teachers' insufficient understanding of the concept of sustainable development, serves as a "significant inhibiting factor" for the successful implementation of ESD in the classroom. Such deficiency in awareness can be attributed to the fact, that only a few educational training institutions do fully prepare teachers to teach ESD in the classroom (Anyolo, 2015). This inevitably contributes to a lack of awareness amongst teachers, which results in a lack of action for change towards sustainability. Anyolo (2015, p. 43) further advanced that, "if teachers are neither aware nor involved in sustainability practices in schools and communities, neither are their learners," which defeats the goals of ESD. There also exists a vast reservoir of material from which teachers should choose, which no doubt becomes overwhelming. Teachers do find that for the most part, a large volume of this information does not attend explicitly to sustainable development (Summers et al., 2003).

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Educational researchers have posited that integrating inquiry in the classroom can be difficult (Maxwell et al., 2015). Some teachers story IBL as time-consuming, a distractor from the teaching of cognitive content, time-wasting (Kazempour, 2009); ineffective due to class size and lack of resources (Maxwell et al., 2015). Zhang (2005) declared that few teachers are exposed to inquiry-based constructivist classrooms; hence, they are uncomfortable with implementing this form of pedagogical approach in their classroom. Richardson, Anders, Tidwell and Lloyd (1991), conducted a case study which revealed that changes in classroom pedagogy correlated with teachers' belief. It is, therefore, important that teachers become engaged in professional development. Professional development will enhance their understanding of both ESD and inquiry, and teachers can "take responsibility for their own professional development" (NRC, 1996, p. 69), with the assistance of their peer.

2.4.1 Implications for Increasing Sustainability Education in Primary Schools

ESD has the capacity to reform education and students at large. Increasing sustainability in the curriculum will have some implications both economically and politically. If this form of education is increased in schools, this will provide students with the "dominant syntax" that has been put forward by Freire. Students will realize that they have options and can use these options to direct changes both politically and economically. In citing Burbules and Berk (1999), Gruenewald (2003), spoke to the idea of:

> Critical pedagogy which will allow students to raise questions about inequalities of power, about the false myths of opportunity and merit for many students, and about the way belief systems become internalized to the point where individuals and groups abandon the very aspiration to question or change their lot in life. (p. 50)

Through critical thinking pedagogies, students can become adaptive of Paulo Freire ((1972) critical pedagogy becoming empowered to speak out against power and political corruption. Additionally, such critical thinking allows students to see the connections between and balance the three pillars which SD promotes and to think realistically about the disparities between false ideology and the prevailing conditions of their realities. This will stimulate students into action that will transform their current reality thereby improving the quality of life for all.

However, there seems to be some inconsistency in the research as a few research studies examine direct realities faced by teachers in implementing ESD through inquiry-based learning. This seeks to explore this gap.

2.5 Conclusion

ESD promotes quality education which can be attained through inquiry in the classroom. Many studies have advocated both ESD, and IBL approaches for use in the classroom to not only bring about environmental consciousness, stewardship and enhance sustainability but also for students to become intricately involved in the teaching/learning process. ESD through inquiry allows teaching to become more student-centered while encouraging students to develop critical thinking skills. ESD and IBL effectiveness in the classroom is however grounded in teacher confidence in possessing the necessary knowledge and skills. The potential of ESD in the classroom is unquestionable, as it possesses the catalyst to equip students with the knowledge and power to engender political and economic changes towards sustainable environmental activities. Primary-school students can become agents of change who promote sustainability, so ESD needs to be introduced at this level, and explored using inquiry approaches.

CHAPTER THREE: METHODOLOGY

3. Introduction

The literature emphasized the holistic quality of teaching students about sustainable development, and how this becomes enhanced using inquiry-based learning, which provides the essential pedagogical support for students learning this. The literature has also shown that a gap exists to indicate whether IBL is a robust approach to teach education for sustainable development. One of the problems with IBL is that most teachers are not prepared or confident to utilize this method in their classroom (Buxton, Lee, & Santau, 2008). Thus, it will be essential to determine the depth to which IBL is implemented. Qualitative research is required to answer the research questions of:

- Does the Saskatchewan mandated curricula in mathematics, English Language Arts, social studies and science at grades 6, support Education for Sustainable Development through inquiry-based learning?

- Does this mandated curriculum support teachers who are committed to ESD and who use inquiry approaches?

- What are the barriers/challenges faced by Saskatchewan teachers who are committed to implementing ESD through inquiry-based approaches?

3.1 Qualitative Research

Qualitative research can be characterized as a type of research which allows for the study of social phenomena that cannot be captured by statistical data collection. Denzin and Lincoln (1994, p. 2) pointed out that qualitative research is "multimethod in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in

their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them". Qualitative research, therefore, operates within the "naturalistic paradigm" (Wiersma & Jurs, 2005) to bring an understanding of human experiences in a particular context. Anyolo (2012) added to the conversation his observation by stating that, qualitative research is "an approach that allows researchers to examine people's detailed experiences by using research methods such as in-depth interviews, focus group discussions, observations, content analysis, visual methods, and life histories" (p. 47). In my case, such detailed examination of teachers' experiences provided me with the opportunity to understand these experiences from the teachers' vantage point.

Qualitative research underscores the process of understanding people's "lived experiences" based on events processes and structures as well as their "perceptions, assumptions, prejudgments, presuppositions" (Van Manen, 1977, p. 214), as they make this application to the world around them. According to Amaratunga, Baldry, Sarshar, and Newton (2002), qualitative methodology in research, also provides a superior blueprint for understanding new phenomena and hypotheses. Additionally, it scrutinizes the basis for these hypotheses, and it is advocated as a pragmatic approach "to supplement, validate, explain, illuminate, or reinterpret quantitative data gathered from the same setting" (Amaratunga et al., 2002). Therefore, based on my need to better understand the experiences of teachers in the classroom as they teach ESD and IBL, the qualitative method is the best research method.

3.2 Case Study Methodology

I utilized the case study methodology to explore the outlined research topic. Case study historically was used mainly in the field of sociological studies. However, over the years it has seen an increase in its usage in the fields of "environmental studies, social work, education, and business

studies" (Johansson, 2007, p. 2). This methodological approach is ideal for the study which I conducted, in that it allowed for an in-depth investigation which is needed between the two variables in my research topic. I was able to scrutinize if and how IBL and ESD can be interrelated and embedded in the curriculum in a particular situation and determine if/how this relationship unfolds in a real-life situation.

The choice of utilizing a case study for my research was ideal for several reasons. Firstly, the case study methodology allowed me to conduct an in-depth investigation of my topic researched. Secondly, it is entirely compatible with qualitative research in answering the questions of "how" and "why" about a contemporary phenomenon. Thirdly, the case study provided the allowance for a holistic view of the issue that was investigated. In response to the holistic nature of case studies, Gummesson (1988, p. 76) asserted that this becomes an asset in that, "the detailed observations entailed in the case study method enable us to study many different aspects, examine them in relation to each other, view the process within its total environment and also use the researchers' capacity for 'verstehen [empathy].'" Tellis (1997, p.5) in referencing Yin (1994) stated that a case study provides at least four applications for its usage:

 1) To explain complex causal links in real-life interventions

2) To describe the real-life context in which the intervention has occurred

3) To describe the intervention itself

4) To explore those situations in which the intervention being evaluated has no clear set of
   outcomes.

Robert Yin (1993), who has done extensive research with case studies, asserted that it is a form of, "empirical inquiry that investigates phenomenon within real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources

of evidence are used" (p. 59). Baxter and Jack (2008) referenced Yin (2003) postulated that the case study methodology becomes effective when:

> (a) the focus of the study is to answer "how" and "why" questions; (b) you cannot manipulate the behaviour of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context (p. 545).

The case study, therefore, can be articulated as a methodology which provides a voice for subjects which directly experience an issue or depict in a behavior that cannot be captured by numerical analysis.

3.2.1 Arguments for Case Study

Case Studies do have several advantages and disadvantages which are crucial to note. Table 1 below presents some of the advantages and disadvantages associated with this research design. Table 1 below is demonstrative of how the benefits of the case study do out-weighs the draws backs that are associated with a case study. Case study allows for a researcher to conduct in-depth study of phenomena from different angles to give new perspectives on the issue. These new perspectives can add credibility to prior studies conducted on the issue. Concerning my research, the case study allowed me to understand the integration from the teachers' perspective relating to the curriculum. One of the advantages that a case study added to my research was to hear and to analyze the "voice" of the teacher-participants in my research. Employing a case study methodology for my research provided detailed, real-time experiences and emotions that cannot be captured via a questionnaire or survey.

Table 1. 1 Advantages and disadvantages of case studies (Anyolo, 2015, p. 51)

Advantages of Case studies	Disadvantages of Case studies
Case studies allow for in-depth study to be done, which can capture complexities, relationships and processes.	Credibility of transferability from case studies is challenged, as they depend on a different logic from that familiar in survey.
Case studies are less artificial and detached than traditional approaches such as experiments and surveys	Case studies are soft opinions, and this may often lead to them not be acceptable in some course regulations.
The boundaries of case studies are flexible and can often be tailored to the time and resources you have available.	The flexible nature of case studies makes it difficult for the researcher to keep to the deadlines.
Multiple methods of collecting data, and multiple data sources is typically utilized.	Case studies typically seek to focus on situations as they occur naturally and hence observer effects caused by the presence of the researcher can a problem.
Case studies can be used for a wide variety of research purposes and for widely different types of cases.	

For my research, through the case study, I was able to build a level of trust with the teachers. Trust established between the participants and I, gave them the freedom to become open and expressive of their views based on their experiences with the issue in the classroom. These advantages situated the case study methodology as the most appropriate qualitative methodology applicable for my research.

There are different types of case study; however, for my research, I have chosen the single case study which I believe is more applicable to the variables being studied. The case in my study is the use of IBL to promote education for sustainable development in the general Saskatoon School

Division. The data analyzed, came from the teachers and the four curricula that is English Language Arts, Mathematics, Social Studies, and Science. This approach has both advantages and disadvantages as outlined by Anyolo (2015) in Table 1 that proponents of case study may advance, as well as to which critics may allude. As summarized in Table 1 above, case study afforded me the opportunity to conduct in-depth research in a particular educational situation, the mandated curriculum that teachers must implement therein, and into their effects to implement IBL and ESD. I believe this combination made the case unique, as no study to date has been conducted on the intersection of these variables at the elementary level. Together IBL and ESD present a new area where little information can be found. Therefore, utilizing a case study approach allowed me to gather and analyze rich data and to create a new hypothesis establishing a premise for future research.

Concerning my study, a case study was chosen to determine if/how inquiry as a pedagogical approach does promote education for sustainable development embedded within a particular provincial elementary school curriculum. The case study also provides the allowance to examine if/how this curriculum supports teachers working in a particular place in their efforts to implement ESD using the inquiry approach. It would be impossible for me to consider the case without the context, the school environment, which presented an accurate visual of the interaction and co-relationships as well as impediments faced by teachers committed to implementing ESD and IBL.

3.2.2 Case Study and Triangulation

The case study methodology allows for multiple sources of evidence including documents, archival records, interviews, direct observations, participant observation, and physical artifacts. The use of multiple sources to amass data for my research provided triangulation for the research process. Schwandt (2007) in his definition of the term triangulation posited that it, "is a means of

checking the integrity of the inferences one draws. It can involve the use of multiple data sources, multiple investigators, multiple theoretical perspectives, and/or multiple methods" (p. 298). He further added the "strategy of triangulation is often wedded to the assumption that data from different sources or methods must necessarily converge or be aggregated to reveal the truth" (p. 298). The use of different sources of evidence allowed for the topic being researched to be done from different angles, with each approach converging with the same conclusion. Triangulation, therefore, conforms to the ethical process of safeguarding the validity and reliability of the research process. This, therefore, made the case study a holistic approach in its examination of my topic. Baxter and Jack (2008) confirmed this as they asserted that each data source would provide greater clarity to the researcher of the phenomenon being studied. The factors above have justified why a case study was the most appropriate methodology to be used to bring an understanding of the issue studied.

In my study, triangulation was brought about by the document analysis of the four curricula and the analysis of the interviews conducted with the teachers. The document analysis provided a general overview of whether the curricula facilitate ESD and inquiry that is where and the extent to which it each is visible. The teachers' interviews provided insight of their experiences in the classroom with the curricula to explain the extent to which ESD and inquiry are visible and the realities of the challenges they experience in executing this in their classroom. This, therefore, provided validity to my study through cross verification from the multiple sources of data used in my study.

3.3 Data Collection

Data collection in qualitative research is paramount to the research process as this allows the subjects in the research to give their account of the behavior, issue or experiences being studied.

Additionally, Polkinghorne (2005, p. 138) puts forward the thought that, "the data serve as the ground on which the findings are based." In constructing the research report, I drew excerpts from the data to illustrate the findings derived from the data to the reader. In qualitative research, interview, observations, and review of documents are common forms of data collection. For this research, interviews of teachers and analysis of curriculum documents including the Saskatchewan curriculum for Mathematics, English Language Arts, Social Studies and Science were utilized as my sources for data collection. In using multiple sources of evidence, I was able to attend the ranges of issues that my research questions sought to answer.

Putting interviews into perspective, Potter (1996) defined interview as a "technique of gathering data from humans by asking them questions and getting them to react verbally" (p. 96). Kvale (1996) joined in by stating that the "purpose [of interviews] is to obtain descriptions of the life-world of the interviewee with respect to interpreting the meaning of the described phenomena" (pp. 5-6). Hence, interviews were used as a conduit for the participants to express themselves thoroughly about the research topic, thereby, affording a more appreciated understanding that would not be garnered from the administration of surveys or questionnaires. The interviews conducted consisted of semi-structured questions fundamental to the research topic and research questions being investigated. However, room was given whereby both I and the participants could divert to elucidate a response given. Curriculum documents used in my research have the added advantage in that they were readily available, to make easy access to information that may not be readily procurable from individuals who may be reluctant to talk or may be difficult to track down. Utilizing documents as a means of data collection afforded me the opportunity to study the visibility of both the variable of inquiry-based learning and education for sustainable development across my four choices of subject areas at the Grade 6 level. This proved to be a convenient, detailed

and reliable means of gathering data which yielded opportunities to comparison with what exists in the curricula with what was attained from the interviews conducted.

Documents in the form of the Saskatchewan Curricula for the subject areas of mathematics, English Language Arts, science and social studies at the grade six level were evaluated to ascertain how each curriculum makes provision for education for sustainable development to be taught, and the extent to which inquiry is used to facilitate this integration into the curriculum. The curricula coupled with the interviews conducted added rigor to the research conducted to achieve triangulation. The interview discussions addressed each teacher's experiences with IBL and ESD in their classroom, including the challenges and barriers they encountered along the path of teaching sustainability to their students.

3.3.1 Data Collection Process

Data collected for this research was two-fold, through the use of documents, that is, the Grade 6 Saskatchewan Curricula for mathematics, English Language Arts, science and social studies and by interviews. The maintenance of integrity and validity was central to the data collection process. Due diligence was done to ensure that the standards for the criteria for the recruitment of the teacher participants were maintained. Teachers were sensitized about the research, its purpose and their role in the research process. Privacy and anonymity were maintained during the interview process, transcribing and storage of the teachers' conversations. Analysis of the curricula were also kept private and confidential.

3.3.2 Sampling

The trustworthiness of qualitative research is determined by its sampling technique. Therefore, it is important that a systematic process is applied to choose the participants to be reflective of a credible and indicative sample. Anyolo (2015) in reference to Patton (2001) stated

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that purposeful sampling is more compatible to be used with qualitative case study research. Thus, in choosing the participants (teachers) for my research purposeful sampling techniques were utilized. The teachers for the interviews were selected based on those who could give the best insight into my research topic. Additionally, teachers from different school demographics were chosen for the research in order to provide "maximum variation" thereby strengthening the trustworthiness of the aggregated results of my research. This is affirmed from the fact that if people from different situations provide similar responses, the assumption can be made that transferability from one situation to another is more likely to be valid. In order to execute this selective process, a selection or criteria framework was established that outlined the variables that determined their eligibility for the selection process. The criteria used for the selection process include:

- Elementary teachers from the local School Division

- Use inquiry-based learning in their teaching practice

- Include education for sustainable development in their practice

- Teach between grades four to grade eight

A key contact who does significant work with sustainability with several elementary schools in the Saskatoon Schools Division was instrumental in locating such teachers who were willing and would be able to provide detailed information in response to the interview questions I generated based on my research topic. A total of five teachers were selected from five different schools within the School Division.

3.3.3 Interviews

A total of eleven key questions were used to explore the experiences of teachers in relation to my research topic. The interviews were analyzed by employing the qualitative thematic analysis approach. Thematic Analysis is a method used to search and analyze themes from data collected

by "careful reading and re-reading of the data" (Rice & Ezzy, 1999, p. 258). The themes identified, were the most salient to my research topic, and hence, formed the categories for analysis. The thematic analysis approach also provided me with added insight, that has allowed me to uncover themes and embedded concepts (Rubin & Rubin, 1995) that were not visible from first glance from the interviews conducted. According to Braun and Clarke (2006, p. 82), a "theme captures something important about the data concerning the research question and represents some level of patterned response or meaning within the data set." Identification of themes is not merely determined by prevalence within the interview, that is, how many speakers articulate the same theme throughout the entire interview. I identified a theme, based on whether it sufficiently captured that which is considered relevant to the overall phenomenon being studied. Such allowance by thematic analysis gave me the flexibility I needed to pinpoint themes (Braun & Clarke, 2006) as I analyzed the interviews.

Themes from the interviews were identified utilizing the inductive thematic approach. The themes amassed are not predetermined by the researcher. Inductive analysis can, therefore, be defined as, "a process of coding the data without trying to fit it into a pre-existing coding frame, or the researcher's analytic preconceptions" (Braun & Clarke, 2006, p. 83). The identification and analysis of themes from the interviews conducted were done employing Braun & Clarke (2006) six phases of analysis as shown in Table 2.

Table 1. 2 Phases of thematic analysis (Braun & Clarke, 2006, p. 87)

Familiarizing yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.
Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the analysis.

I also utilized the computer-assisted data analysis package NVivo, once I was able to establish a reliable and robust coding frame. Coding is essential as this allowed me to identify the most relevant and crucial data from the corpus of data, to be placed in categories which constituted my data set. The Qualitative Data Analysis (QDA) computer software package, NVivo employed did improve the quality of the analysis conducted. AlYahmady and Alabri (2013) in reference to Bazeley (2007) list five tasks which NVivo does to reduce the rigors of analysis of qualitative data. These tasks include:

- Manage data: by organizing a number of muddled data documents. That includes interview transcripts, surveys, notes of observations and published documents.

- Manage ideas: in order to understand the conceptual and theoretical issues generated in the course of the study.

- Query data: by posing several questions of the data and utilizing the software in answering these queries. "Results of queries are saved to allow further interrogation and so querying or searching becomes part of an ongoing enquiry process".

- Modeling visually: by creating graphs to demonstrate the relationships between the conceptual and theoretical data.

- Reporting: by utilizing the data collected and the result found to formulate transcript reports about the study conducted. (p.182)

These innovations have encouraged my use of this computer software package, which in my mind, did improve the quality of my research.

3.3.4 The NVivo Process and Interviews

The interviews conducted were transcribed, thoroughly read, and salient themes and points were noted. In order to properly manage the volume of data from the interviews conducted, the computer assisted qualitative data analysis software (CAQDAS) of NVivo which aids in the organization and analysis of qualitative data was employed and this software also enabled some form of analysis to take place in the early stages. Firstly, the data were carefully read to ascertain a sense of what the transcripts entailed, as well as to allow for familiarity with the data to be analyzed. Next, the transcribed documents were imported into the NVivo software where they were explored and scrutinized, which allowed for visualization and the findings to be shared. Information or references that are deemed compatible with the research topic are placed into "Nodes" (categories in the NVivo software). Coding is a fundamental part of the NVivo process whereby salient information concerning a particular theme is stored in a node for further analysis. Each node is given a name which is referred to as a "Parent Node" or Theme. For example, the nodes or themes in the coding of the interviews included the following:

- Work Experience
- Understanding Sustainable Development
- Understanding of Sustainability
- Understanding of Inquiry
- Understanding of ESD
- The Curriculum and ESD
- Teacher's Belief and Values
- Sustainable Citizens
- IBL and ESD
- ESD and Educational Outcomes
- Classroom Projects
- Classroom Pedagogy
- Barrier or Challenges with ESD and IBL in the classroom

Nodes were generated using Bezeley and Jackson (2013) method which Adu (2015, 56:43) video further summarized into three main step which are:

1) Identify relevant information in the data.

2) Assign a word or phrase (a concept) that best represents the relevant information.

✓ Note: Make sure it is consistent with the research question.

3) Document why the information or node is important (i.e., taking notes about your thought regarding the coding using the "memo" option in the NVivo software).

As demonstrated in Figure 1 below, Child Nodes are considered sub-nodes or sub-themes that amalgamate to form parent nodes that emerge from coding. Again, both parent and child nodes formed a consistent framework where segments from the interviews which are representative of the parent and child nodes are selected and stored. This system aided in consistency and transparency of analysis of interview transcripts which added reliability and validity to the findings.

The auto coding technique was also utilized. Auto-coding allowed me to organize the teachers' responses based on questions asked during the interview. This aided quick comparison and analysis of each participant's responses to a specific question asked.

Figure 3. 1 Distinction between Parent Node and Child Node

Parent Node or Theme

Child Node

Understanding of Sustainability

Kaye: So, to mean, sustainability means when I leave this earth my footprints will be zero, right. So, in the sense of I'm not taking more resources than I am replacing.

Children and Sustainability

Alice: I do think everybody should give them (kids) those opportunities where they see what's happening with the environment or see what happening and have a chance to make a difference.

Sustainability and Adults

Child Node

Hope: I think that some people don't understand it, I think they think it's just that we need to just recycle, and we need to not drive big cars and those are surface things.

3.3.5 Documents

In determining the extent to which the curriculum facilitates education for sustainable development through inquiry-based learning, I performed a document analysis on the Grade 6

Saskatchewan Elementary curricula. The focus was chiefly on four core curriculum documents used at this level: mathematics, English Language Arts, science and social studies. These four subjects were analyzed because they allow students to acquire knowledge and skills to explore and comprehend the world, as well as to possess the capacities to make intelligent decisions about their world. These for subjects are also amendable to teaching ESD and to inquiry, thus patterns observed will hold for the range of grades. Document Analysis is a qualitative research technique used for synthesizing and evaluating data in the document. This approach was used to not only make sense of the data, but it also provided the added advantage of triangulation- "the combination of methodologies in the study of the same phenomenon" (Denzin, 1970, p. 291). Hence, I was able to analyze multiple data from different perspectives, enhancing the credibility of the conclusions I drew. Utilizing document analysis for me, entailed reading and interpreting the four curricula, using a combination of elements for both content analysis and thematic analysis. Content analysis, as postulated by Bowen (2009, p. 32) as the "process of organizing information into categories related to the central questions of the research." Using a content analysis approach, I was able to identify meaningful data in the document examined.

NVivo played an integral role in the analysis of the curriculum documents, and I employed a similar approach to uncover patterns as I used when analyzing the interviews. In this case, however, I coded data from the documents using six themes that reflect the importance of educating for sustainability, as identified in the literature. These six themes include:

- Citizenship and Stewardship

- Future Looking Outlook

- Interdependency

- Equity, Human Rights and Social Justice

- Needs and Rights of Future Generations

- Action for Sustainability

Other themes emerged and were also coded to capture the essence of ESD and IBL as embedded in the curricula. Coding of the curriculum documents then provided the avenue for visual representations of the data to be created. Visual representation of the data provided comprehensive insight of the data coded, which enabled the sharing of findings coherently and straightforwardly. The visual representations of the data created through the mechanics of NVivo also strengthened the findings from the document analysis done. The visual representations I utilized include:

- Tree Map- This diagram provides a stratified view of how the six themes which are reflective of both IBL and ESD are structured in importance as in the curricula analyzed.

- Word Frequency Query- This provides a list of the most frequently used words in a source. For my research, a word frequency query was done on the word "inquiry" in the four curricula analyzed. A word frequency query provides a display of the frequency of the word relative to the total words counted. This was done to provide an insight of just how inquiry is considered as a student-led pedagogical approach to promote student-driven learning activities in each of the curricula.

3.4 Limitations

In conducting my research, I wanted to investigate the potency of inquiry-based learning to promote education for sustainable education at the elementary level. While the upper end of elementary education in Saskatchewan typically extends to Grade Eight, I chose to examine the Grade Six core curricula (Social Studies, Science, Mathematics and English Language Arts) here in Saskatchewan because this grade level correlates with the top end of elementary education in Jamaica and other Canadian provinces, like Alberta for example. Although the choice to examine

core curriculum documents for one grade level does impose a limitation, the data gathered through cross-curricular document analysis does provide sound insights into whether and how inquiry approaches promote ESD at the elementary level in Saskatchewan and hence, my justification for interviewing willing teachers who teach at this level.

Another constraint that impacted my study was time and space for completing my master's degree. My study is bounded by a geographical space, that is, schools within local Saskatoon School Divisions. The recruitment of teachers was dependent on two factors: firstly, the recruitment criteria of the study and secondly, the teachers' willingness to participate in the study. A list of possible upper elementary (Grades 6 to 8) teacher participants was compiled with the assistance of a key contact and invitations were sent out to teachers through the key contact. Those who were willing and met the criteria were accepted as participants. Hence, one of the limitations that prevailed for this study was the lack of teachers working at the grade 6 level who met the criteria and who were willing to be participants of the study. The time available to conduct this research did not permit for long duration of time to be spent on participant recruitment, and thus, a decision was made to utilize those teachers who made themselves available for the study.

CHAPTER FOUR: DATA ANALYSIS

4.1 Analysis of Teacher Interview

4.1.1 Introduction

A total of five teachers from four schools within the Saskatoon Public School Division participated in the research study. Table 2 below provides a profile on the teacher participants based on their experiences and school type.

Table 4. 1 Teacher Participant Profile

Teacher (Pseudonym)	Gender	Grades Taught	Teaching Experience	School Demographics	Pedagogical Approach in Classroom (Years)
Kaye	Female	8	9 years	Inner-city	Project-Based and IBL (7 years)
Fiona	Female	6, 7 & 8	24 years	Upper-income	Project-Based and IBL (24 years)
Hope	Female	4-5	14 years	Upper-income	Inquiry-Based Learning (14 years)
Alice	Female	3 to 8	9 years	Middle-income	Inquiry-Based Learning (1st year)
Kerry	Female	8 and 5-6	4 years	First Nations	Project-Based and IBL (4 years)

The participants' years of teaching experiences, as well as their school demographics, added diversity to the study, which was presented in the perspectives given based on my topic that was researched. Analysis of the interviews showed that seven themes were predominantly featured in the conversations of the teachers interviewed. The seven themes include:

- Understanding of Sustainability

- Understanding of Sustainable Development

- Importance of Teaching Education for Sustainability Development,

- Transforming the Written Curriculum into the Lived Curriculum

- Lack of Teacher Training Experiences

- Text-based Pedagogical Approach versus Inquiry-based Learning Approach

Examination of these themes address two of my research questions by elucidating each teacher's understanding and perception about sustainability, sustainable development, education for sustainable development and how the curriculum does or does not facilitate these through inquiry-based learning. The themes drawn from the interviews conducted also enables understanding of the constraints that each teacher encountered from their vantage point. The findings from the interviews are presented by themes, below, and this is followed by an in-depth discussion that enables the drawing of inferences and conclusions.

4.1.2 Teacher Knowledge

Analysis of the interviews conducted revealed that the teachers have misconceptions concerning sustainability and sustainable development. These misconceptions appear to have served as impediments to teacher willingness to integrate ESD in their classroom. The points extracted from the interviews below provide more detailed explanation.

4.1.2.1 Understanding of Sustainability

Conversations with the teachers revealed better insights into their understanding of sustainability. As they addressed the question about the meaning of the term, it was revealed that these teachers possess diverse understandings about sustainability. Kaye stated, "sustainability means when I leave this earth my footprints will be zero, right. So, in the sense of I'm not taking more resources than I am replacing". Kerry sees sustainability in a different light, indicating that she thinks, "sustainability is what the land base can support in terms of a human population. That's what sustainability is to me, living in a way that your land-based can actually support the

population". Here Kaye is making reference to the sum total of her life having zero effect on the earth, whereas, Kerry explained that sustainability as the land being able to support humanity comfortably. In their response to questions about the meaning of sustainability, both Fiona and Hope included ideas about maintaining and preserving the overall health of the planet, now and beyond. For example, Fiona mentioned, "making sure that the planet stays with us healthy forever" and Hope referred to being a "steward to the earth". Alice, on the other hand, has a broader view of what sustainability entails. She declared that sustainability is about "balancing the economy ensuring that resources are there and making sure that they are left for future generations and making sure that we are not taking too much and making sure our environment is still there and still healthy". Her definition amalgamates the economic and ecological aspect of sustainability to ensure sustenance for humanity now and for the future.

The definitions provided by the teachers regarding the concept of sustainability demonstrate that teachers do have some understanding of what sustainability entails. All of the teachers include the notion of environmental protection and preservation with just Alice, as the outlier, including the economic dimension of sustainability in her definition. Sustainability does include reducing our human footprint, preserving the earth for now and for future generations, but goes further to include a mutually sustaining relationship with the unification of environment with economic and social dimensions for lasting prosperity. The teachers' perspectives coincide with the viewpoint of Gough and Sharpley (2005) who view sustainability as that which encompasses balancing the economic, social and environmental needs, fostering of citizens who are stewards of the environment thereby becoming custodians of the environment.

It is important to accentuate another point made by the teachers. They expressed the view that sustainability is immensely complex and that the buzz surrounding the word makes it difficult

for people to understand. Hope highlighted the idea that her understanding of the term 'sustainability' may be skewed and that what she passed on to her students is based on her conceptualization of what sustainability entails. Mensah and Castro (2004), along with Taylor et al. (2015) do also admit that understanding the full complexity of sustainability does pose a problem for teachers and this affects their resolve to teach this in their classrooms. The sustainability ethos maintains that the economic, social and environmental dimensions are interrelated and all three must be infused into the curriculum so that students can learn about and adapt "ways of living that are ecologically, economically, socially, culturally and personally more sustainable" (Taylor et al.,2015, p. 12).

It is also important to note that none of the teachers included notions of social justice in sharing their understanding of sustainability. A view of sustainability that limits its definition to mere environmental protection and positions sustainability only in a framework where the earth's natural resources are utilized in ways that do not compromise economic development, lacks complexity. Excluding notions of social justice when considering environmental protection while maintaining economic development, means that deep consideration of all aspect of social life and quality of life are ignored. Social justice is a multidisciplinary concept that expands across multiple ways of thinking and identifies and connects quality of life issues. Hence, the sustainability dialogue must be expanded to take seriously all the components that are associated with the three pillars of sustainability. Social justice interwoven with the idea of sustainability complements our desire and our work toward achieving a sustained, excellent quality of life for all, now and in the future.

4.1.2.2 Understanding of Sustainable Development

From the discussions had with each teacher about sustainable development (SD), it was clear that the clarity of this concept is vague. Most of the responses from the teachers about sustainable development reverted to their understanding of the term, "sustainability". Alice specifically opened up about her lack of understanding of sustainable development. She stated that:

> I'm being honest I don't understand a ton about it. I'm not real verse on it. Like I understand the concept of making sure that we are taking care of our environment, our resources and making sure that we are taking care of the earth and living with the earth and not just this is our earth we do whatever we want to do with it, I guess it's an action plan you're making plans to work towards sustainability. I'm actually not quite sure.

The elusiveness of this understanding does impede ESD from being taught in the classroom. Gough (2002) argues that an understanding of SD concepts is vital for teacher confidence and functionality in the classroom. Teachers posit that "being able to attach some meaning to the concept, even if only implicitly, is essential to doing their jobs" (Gough, 2002, p. 62).

Despite the ambiguity and debate concerning sustainability, sustainable development and education for sustainable development, teachers who responded to teaching ESD, are those who value sustainability Many research studies of ESD have been centered on the ecological aspect, with not much done on the integration of three interconnecting constituents of SD. The scarcity of such research has resulted in the lack of adequate illustrations for teachers on how to integrate and intertwine the economic, social and environmental dimensions of SD in the classroom. This ultimately makes ESD difficult, hence teachers' apprehension in teaching this in the classroom.

4.1.2.3 Importance of Teaching Education for Sustainable Development

As the teachers spoke about the importance of ESD to reverse the global environmental dilemma that the world currently faces, there was a consensus that there is a need for children to be taught sustainability in schools. The teachers see this as fundamental to effect changes towards a sustainable future. As Kaye asserted, "I think that's our only way of doing it. I mean when I talk about sustainability in my room it sounds a bit dark, but I remind the kids that this is not a problem that my generation will have to solve, we should solve it, but we don't, but your generation will have to". Kerry was expressive in stating that teaching sustainable development to students in schools will "allow [them] to go into their values, and it gives them space to think about how their values can be connected to sustainability and how their hearts are connected to sustainability. I think when we place our hearts in it, the decision making tends to be different". Cultivating values and attitudes of SD are indispensable to the objectives of ESD which will advance the growth of "ethical and responsible citizens" as posited by Gough and Sharpley (2005, p. 13). Alice is of the view that teaching ESD in schools will "shape [students into] citizens to be ready for when they leave school. They need to be ready to go out into the world and to take care of our earth and to take care of our world and to be good citizens". Fiona adds another reason for why ESD should be taught at the elementary level, arguing that children have that inherent ability to capture adults' attention. She stated, "Every time we hear about a kid that started a movement of some sort, those are the ones that are highly followed". Clearly the teachers, like UNESCO (2005), believe that if we want to produce dynamic agents of change who work towards sustainability and sustainable development, then ESD at the elementary level is vital as this will empower children to take action towards attaining a sustainable future.

The teachers supported ESD at the elementary level, but all established an argument that this also needs to be included in the early childhood curriculum. Kaye argued that:

It (ESD) needs to be taught not just in the older grades; it needs to be taught in the younger grades. So, whatever a student learns in grade 1, then in Grade 2 they build on that knowledge and continue to learn more. Right so, by the time they get to me their beyond, "so we're going to just pick up garbage". They are beyond that now, so now they are like what if we like talk to the School Division to build solar panels on our school roof.

Kerry weighed in, stating that ESD "needs to start from the moment they walk into our educational institutional system. I think it needs to start from they are little". Fiona also agreed that ESD in schools should "start as early as anyone can mimic and learn from the adults and people around them. And so, then I move from as soon as they can assume any form of ability to have the conversation, the conversation starts".

4.1.2.4 Transforming the Written Curriculum into the Lived Curriculum

Integrating SD into the curriculum through ESD has been the vision and mandate of UNESCO through its declaration of the Decade for Education for Sustainable Development which seeks to reorient curricula. It is argued that that reorientation of the curricula to support ESD, would assist in developing citizens possessing knowledge, attitudes, actions, values and behavior towards a sustainable lifestyle. It was discovered from the interviews conducted that some of the teachers are of the perception that the Saskatchewan elementary curriculum does facilitate the integration of sustainability and ESD. The excerpts below are indicative of their views:

I think it does. Actually yah. What I like about our new curriculum is that they talk about sustainability not just in Science, it's an objective in Social Studies, it's an objective in

English Language Arts, and then you can easily make it an objective in Math. Right so, looking at the percentage of how fossil fluids we are using, and we are working with decimals, and there's a way you can do it from math. But I would say that the curriculum does offer many different opportunities for cross-curricular projects on sustainability in different ways. I think the curriculum actually, this is an area that the curriculum does a good job. (Kaye)

Hope explained her perspective:

My understanding of what curriculum is, this is an outcome, but how you get there is on you as a teacher, so thinking about that if you know how to use the curriculum well, I think it is a good curriculum to be able to use and manipulate into your projects. But if you don't know how to do that, then I think it will not help you. I think for those linear traditional minded I don't think they are open enough to be able to find all the things that you need to have a good actionable plan for sustainability. I don't think it encourages and I don't think it discourages. I think there is enough in there that you could really pull some things out and do some pretty good work.

The excerpts above are representative of older, more experienced teachers interviewed, who have been using student-led pedagogy in their classroom and who have also incorporated sustainability education in their classroom. These experienced teachers are able to manipulate the curriculum as it necessary to integrate aspects of both inquiry and ESD in their lessons. Kerry, in agreeing with the teachers above, does insert that despite evidence that the curricula in question do allow for ESD t in the classroom, this may not be clearly visible to all teachers, especially those who employ the traditional forms of pedagogy. Kerry's comments illustrate that teachers do experience problems in

transferring what is written in curriculum to provide an embodied experience of education for sustainable development. Kerry stated:

> I think the most significant barrier to inquiry and land-based teaching is teachers not knowing how to do it and not understanding how inquiry and land-based education ties to our curriculum. If our curriculum was more explicit in identifying how land-based work and inquiry were valid and valuable, more 'mainstream' teachers might understand how to integrate it into their teaching.

Some of the less experienced teachers did not think the curricula were clear enough in indicating where and how to integrate inquiry and education for sustainable development and that this acts as a direct challenge and impediment for the successful, dynamic integration of both in their lessons. Alice, one of these teachers, addressed this directly by highlighting her challenge that ESD is not sufficiently visible or fully explained in the current curricula making it extremely difficult for her as a new teacher to integrate this into the classroom. Alice explained:

> I don't think you see it enough, but as teachers, we are thought to make those connections. So, I think if even it doesn't necessarily, when you need to teach with sustainability that's something that I think we go back to anyhow. I don't think it's in there enough, I don't think it is explained enough, and if you don't have that prior knowledge like as I said before, I don't know if you would make those connections. But there are some connections that I don't feel comfortable making because I'm not a hundred percent sure.

From Alice's statement, it is evident that as a beginning teacher, she is experiencing difficulties integrating ESD in her classroom. This idea was affirmed by Kerry who acknowledged that teachers just embarking on the sustainability trajectory in their teaching practice can experience

challenges. Kerry asserted that this may result because teacher education does not focus enough on ESD which means that new teachers lack suitable conceptual knowledge to feel confident to deliver this knowledge in their classrooms.

4.1.2.5 Lack of Teacher Education Experiences

Conversations indicated that although some teachers do confirm that the curriculum does facilitate ESD, it was revealed that most teachers feel ill-prepared to teach this in their classroom. This unpreparedness emanates from three main factors. First, teachers are not educated to teach this in the classroom and thus are quite skeptical about how to go about incorporating this in their practice. Secondly, there is a poor conceptual understanding of ESD, thus making it quite difficult to transfer this into the classroom. Thirdly, some teachers see ESD as an addition to the already dense curriculum, so they see inclusion of ESD as extra workload.

As an experienced teacher, Hope explained:

> So, what I think we need to do is to teach people how to use the curriculum. But I think that some [teachers] out there they look at the curriculum, they see the outcomes, and they want to check the box of every one of the indicators. The indicators are not what you should be looking at in our curriculum. They are ideas. They are not a checklist, but people think that they are a checklist because people told them that they are checklist the people who don't know what the curriculum is.

Based on her many years of experience with teaching sustainability and using inquiry-based learning in the classroom, Hope is able to employ the curricula to match ESD learning goals. She believes teachers need to be taught how to draw on written curriculum appropriately, as she thinks that most teachers approach the curriculum with an impaired vision of myopias. When teachers see

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the curriculum as a long checklist of things to be achieved, she thinks these stifles the real value of the curriculum for ESD - that is, a guide to assist in changing in values and attitudes, where students become receptive of personal responsibility that will in effect improve quality in our way of life currently and for future generations.

Teacher participants indicated that one of the most significant deterrents for the advancement of ESD in the curriculum is teacher education. The resolution of environmental problems and fostering children as agents of change begins firstly with teachers as the gatekeepers who will encourage and fuel this form of education. Hence, new and current teachers in the classroom must receive education that demonstrates how to utilize the curriculum to address sustainability. Such education will assist teachers to unravel the complexities that are associated with sustainable development, thereby equipping teachers with confidence to integrate and impart ESD in their lessons. As Kerry explains, "many teachers haven't had those actual life experiences to be able to help walk students through those experiences. I think for a lot of teachers, if they were to start doing it, they would be doing it for the first time themselves which is not a bad thing but it makes it a little unknown". Hence, Kerry also provides a justification for teacher education with a focus on what ESD and inquiry entails and how to implement both in practice.

4.1.3 Text-based Pedagogical Approach versus Inquiry-based Learning Approach

As it relates to whether inquiry is the best method that can be used to teach sustainability through ESD, all of the teachers affirmed this as the best pedagogy to enable students to make the connections. For example, Fiona and Hope argue that ESD using inquiry is a deviation from the traditional forms of teaching to a more student-led form which makes the connections more authentic. This point was put forward by these teachers:

So, for me, it's always a combination of things. If you take traditional practice where its either you read and regurgitate, and or listen to the lecture, or you can do a YouTube video and restate it, you don't go very far. But what you really need for having sustainability, because sustainability is all about actions, is you need hands-on. You need to connect with the land, and you need to have a sense of your own independence and directing your learning from inquiry-based learning because then you are the person directing your learning and not somebody else and it becomes valuable to you because you're the one asking the question in the first place. (Fiona)

Well, because I know that research tells me that inquiry is one of the best ways for kids to be able to feel empowered and engaged and I know that research tells me that if you're empowered and engaged that you learn at a pace of 10 or 15 times more than you would in another way. So, knowing all of these things I know that inquiry and giving kids that ability to go through that kind of way is the most powerful way to get kids to be able to connect to their learning. (Hope)

Both Fiona and Hope went on to say that with the ESD and inquiry students not only become more stimulated and motivated to learn, but they also become self-directed learners who begin to ask those probing questions. This results in students who are able to understand the interconnectedness of the different pillars of sustainable development and how they can sustainably advocate for these in order to preserve the planet on which they live for now and the future. Some teachers interviewed suggested that the narrow focus of teachers who have the traditional means of teaching in deeply ingrained, greatly resist any attempts to change their practice. Hope described the traditional form of teaching as the "sickness of education". This is captured in her statement:

I believe that there's lot of sickness in education because I think that people are still caught

up in old traditional thought patterns, and old traditional being and that means to me that

you sit in the classroom and you have a book in front of you that somebody has written that

you follow page by page and are in a row with a desk and I stand in front of you and I open

your mind and pour in the information. I think that is a sickness of education because all

the research that people are doing are telling us that is the least common denominator of

giving good education to students.

Hope further elucidated that the "sickness in education" requires a change in order to have "sustainability of the higher education that our kids are going to need to solve the problems of the world." Hope continued by highlighting a very salient point as she argued for a change in classroom pedagogy that will facilitate SD. She stated that "without education that's going to promote the clarity and the mindfulness and the deep ways of learning differently, how are we going to change what we have done?" Much food for thought.

In agreement with teacher interviewees, Armstrong (2005) in his research on inquiry-based learning and environmental education was critical of the methodology utilized to teach this in the classroom. He argues that "the method by which teachers deliver these concepts has remained the same [with a] heavy reliance on textbooks, note taking and regurgitation of information with very little critical thinking and linking of related concepts and ideas. In addition, students are confined to the classroom and inactive for the majority of the day – which is unnatural for any child" (Armstrong, 2005, p. 229).

Education for Sustainable Development is bringing about education reformation that promotes learning more holistically, thereby dismissing the deeply held notion of what learning should resemble and its end product. Friesen and Scott (2013, p. 3) state that "within the curricular

landscape of education, the term inquiry has become a central part of mission statements, general outcomes, and program strands in jurisdictions across Canada and the United States" as it produces engaged, critical thinkers, ethical citizens (Friesen & Scott, 2013), and students who are more environmentally consciousness (Nazir & Pedretti, 2016). These characteristics produced by inquiry learning are enveloped within ESD. Hence, ESD is a good fit to be channeled through inquiry in the classroom in comparison to the rigid subject- matter centered focus of the curriculum and teacher-centered, chalk and talk pedagogy of teaching.

Benavot (2014) supports this notion arguing that through EDS and IBL, "young people can live informed, meaningful and transformative lives" (p. 5). This is confirmed by Gough and Sharpley (2005) who document the influence of inquiry learning in ESD, in that the two are compatible in deepening student understanding of stewardship, hence creating sustainable citizens. Through inquiry and ESD, students become engaged in new and different experiences which authenticates the essence of sustainability and sustainable development. Hence, as Pretorius et al. (2016) posited, "learning experiences need to be tailored to fit circumstances in different places and contexts and to empower students to address environmental issues in various situations, which is identified as a definite need [elementary students]" (p. 3).

4.1.4 Teacher Philosophy and Teaching Education for Sustainable Development

There is a strong correlation between teacher belief and classroom practices. Therefore, the conjecture made is that a teacher's belief concerning sustainability will influence whether education for sustainable development is taught in the classroom. Kerry argues that the problem is not whether the curriculum facilitates education for sustainability, but the hindrance instead has to do with the teacher as she states that, "the problem I think has more to do with teacher philosophy than curriculum. Right now, I think us land-based people are outliers in education". Fiona adds:

Often the sustainability portions of the curriculum is really tiny, it's easy to let them drop and focus on other things, and so it doesn't get taught. And then for others, it's the foundational values that the teacher has and it's linked through everything they do, through three-quarters of their instruction practice, right. So, it really does I think depends on what the teacher believes in, in that room.

These two comments give credence to the findings that the prominence of ESD in the classroom, is mainly dependent on the teacher's belief and value system. If sustainability is ingrained in their value system, then it will become a feature of importance in their practice.

4.1.5 Barriers/Challenges to Integrate Sustainability through Inquiry in the Classroom

According to the UN Conference on Environment and Development held in Rio de Janeiro (1992), education is the conduit by which sustainability and sustainable development must be channeled in order to improve lives and to provide people with the capacities to tackle both environmental and developmental problems. The UN suggests that this form of education must begin at all levels. However, teachers interviewed at the elementary level pinpointed several challenges that they encountered in their effort to make education the core for the dissemination of this message that will engender the broad-based transformation in attitude and values to take root.

Concerning this issue, all the teachers interviewed confirmed that they use inquiry to implement ESD in their classroom. However, they underscored the fact that they have experienced obstacles that they had to overcome. Most of the teachers have claimed that their years of experience in teaching has added some level of credibility to their resume which has afforded them the privilege of having a free hand in integrating ESD with IBL in the classroom. However, there

are still some challenges that they face, and these are challenges that new teachers will be subjected

to as they endeavor to incorporate sustainability in their classroom through inquiry.

Figure 4.1 Barriers and challenges experienced by teachers to integrate Education for Sustainable Development with Inquiry-Based Learning in the classroom

Challenges and Barriers

Time Constraint

Lack of Administrative Support

Lack of Training

Inability to Release Learning Power

Lack of Sustainability Network

Lack of Staff Support

Parental Support

Connection with businesses and industries

Connections with Indigenous Knowledge Keepers

Connections with community groups
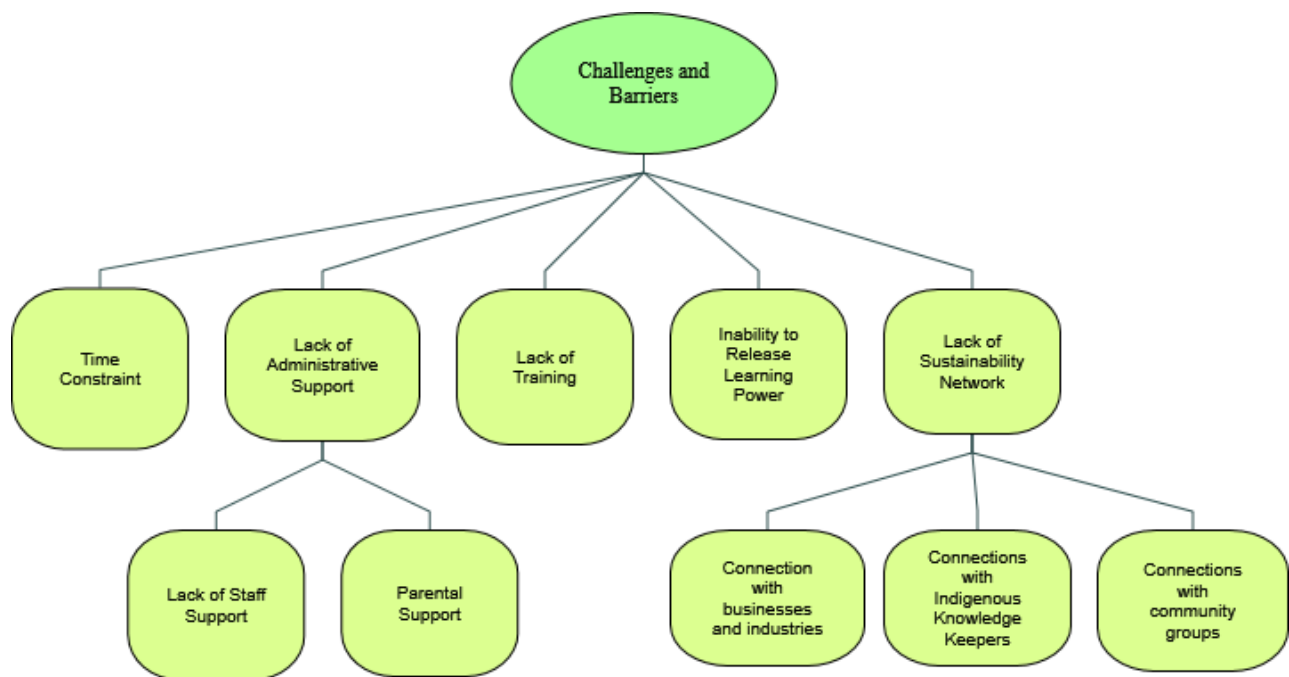
The diagram above provides a visual representation of the various barriers that teachers

encounter as they endeavor to integrate ESD in the curriculum through inquiry. The following

discussion provides insights into the challenges teacher interviewees actually grappled with.

4.1.5.1 Time-constraints

Kaye, Kerry, and Alice identified time constraint as an impediment for the integration of

ESD and IBL in the classroom. This, as they articulated, stems from the fact that the central learning

agenda is focused around the qualification aspect of education (Biesta, 2015). This is evident from the following excerpt:

> It takes way longer than creating a poster, so sometimes you can feel like oh man we have been working on this project for a month right, and I have just three months left in school. So, you can feel that pressure as a teacher. I know that even if I was the most amazing teacher in the world, there is no way that I could get through the whole curriculum. So, I'm picking bits and pieces that I think my kids will be interested in and focusing on those bits and pieces and I have to be ok as a teacher knowing that we barely touched other topics. Like we did a one-day thing on that, and I just have to be ok with that, and I'm sure that maybe the Division maybe has a different opinion to what I'm saying, but at the end of the day, I just want my kids to be learners. (Kerry)

4.1.5.2 Lack of Administrative Support

 Kaye, Fiona, and Hope reveal that lack of administrative support is a major obstacle that teachers who are willing to use inquiry-based learning to teach ESD in their classroom encounter. They explained that some principals see this form of learning as unproductive because visually it is untidy and noisy and requires the students to most times exit the four walls of the traditional setting of the classroom. Fiona provides this explanation of why administrative support is crucial in this respect. She articulates, "[we] need to have our administrative teams go yah go for it! You need to have your people who are above them go yes! I want to see your school move in that direction. And they have to give more permissions". Without administrative support, this becomes immensely difficult for the teacher to have freehand in having students make those authentic connections to their environment and to their communities where they will be able to recognize the importance of the need for sustainable actions and attitudes for now and for future generations.

This confirms what Benavot (2014) posited – that is, that administrative support is key to the transmission of ESD in the curriculum and even for integration through a "whole system" approach in schools. As Summers et al. (2005) argue, there is grave challenge for schools and administrators who need to become detached from the entrenched teacher-centered curriculum and accept the espouse benefits of a curriculum where ESD is integrated.

4.1.5.3 Lack of Teacher Support

The teachers also voiced the concern for the lack of internal support from colleagues which they pointed out as another barrier that impedes sustainability to be integrated into the classroom. The excerpt below reveals the Alice's thoughts regarding this matter:

> But you still have all these things in the classrooms where you don't have support. So, I think all those things are difficult for teachers when they are teaching inquiry and then trying to say "ok, I'm going to pass some learning on to you or pass the opportunity to you (students) to do some learning. So, it is important for me to have a support system that really supports what I'm doing in the classroom.

Support for ESD should not be consigned to the school's leadership but should also have the backing of the teaching staff. This support is critical if a school is to become adoptive of the whole-school approach towards integrating ESD into the curriculum. Additionally, having supports from colleagues, as suggested by the teachers interviewed, does strengthen collaboration and also provides a vision that is compatible with the school's ability to see ESD as the way forward towards creating students with sustainable behavior and values for the future. Alice strengthens this point as she puts this into perspective, arguing the point that teacher support implicitly adds to the ESD framework, providing motivation for teachers to incorporate this in their classroom.

4.1.5.4 Lack of Teacher Training

Fiona highlighted the need for teacher training in how to integrate ESD in the curriculum, when she explained:

> So, there is PD that you can do that definitely help with that and can show somebody ok let's take sustainability. Where is it going to show up in your English class? Where is it going to show up in your Math? How are you going to integrate this, this and that to get some sustainability knowledge and skills develop?

Due to this lack of training, teachers are ignorant as to where the teachable moments for ESD can be found in the curricula and how to channel this by way of inquiry. This finding correlates with Anyolo (2012) who argued that lack of training results into lack of awareness among teachers which exhibit itself in surface knowledge that is imparted to students in the classroom. Hence, there is abstinence among teachers to engage in this form of teaching. As revealed from the interviews conducted, many teachers who use inquiry in their classroom to teach ESD to do so based on their own values, beliefs and their importance of sustainability to them. The following excerpts demonstrate this:

> It (ESD) is a value piece for me. I think it would be harder if you don't have that sustainability training and value from the time you're young. (Kerry)

> I'm teaching from what I believe and not on because nobody has been out there in a class telling us what sustainability means or how to build that as a capacity in kids. So, this is all by the seat of your pants, this is all passion that people have, and I believe that its passionate people that are living on the land and doing inquiry-based as well because they are on the land, so that's a good connection. (Hope)

4.1.5.5 Lack of Sustainability Network

Another challenge that was outlined from the interviews was a lack of sustainability network. All the teachers emphasized that this network is vital if teachers are going to provide genuine experiences for students that will help them in making an authentic connection to their environment in order for SD to be meaningful. This was articulated by Hope, when she stated:

I've been lucky because I've connected with people in some of those environments and so I've been lucky that I have those connections. But if you didn't have those connections and things like that it would be a lot of surface stuff that you could find. And if you weren't somebody who is able to get out and learn and grow then those connections for you as an educator would be tough.

Such a network includes connections with businesses, industry, and community groups, indigenous knowledge keepers and environmental networks (Gough &Sharpley (2005). Such networking provides links that Gough and Sharpley (2005, p. 12) believe does provide the intersection between "student learning to the workplace and to local environmental and social issues and allows students to become active and involved participants". Alice shares her apprehension in making these connections which arises because she is just commencing the journey toward incorporating ESD and inquiry in her practice.

I'm not from here, and I'm not from this province at all. I've been living here for nearly six years, and I've worked in this school, and I'm not a person who is like out there trying to make connections. I wouldn't say I'm that outgoing to make connections with everybody. I don't feel comfortable calling people and say can you come in and do this for me. I don't

know anybody downtown that can help me with sustainability. So, making those connections, it's not going well.

It is important to note that she does see the benefit of such connections as students do tend to be more receptive and attentive to these resource persons.

Hope is of the opinion that having these sustainability connections are essential for teachers, as teachers do not possess all the intricate knowledge relating to sustainability. Resource persons in a support network are capable of providing first-hand experiences, thereby helping students to understand better the ramifications, as well as the synergies between human actions and issues affecting earth's sustainability. Exposure to such persons will cause students to re-evaluate their values thereby morphing them to become agents of change to charter change in the value system of the society in which they live, in order to cultivate a context of sustainability for now and the future. This coincides well with Orr's (1992) third principle of education that all education is environmental education. Since we reside on the earth, it is crucial that our students also become aware of the interrelatedness of human activity on the environment. What better way to educate students about the environment than to place them in the capable hands of experts.

4.1.5.6 Fear of Releasing Learning Power to Students

Fiona, Hope, and Alice noted that teacher reluctance to release power and control to students during learning processes stands as another barrier that impedes the intertwining of ESD with inquiry in the classroom. These interviewees pointed to the fact that a traditional way of teaching is so deeply ingrained in some cases that teachers seem incapable of supporting student-led learning. The illusion that manifests itself in such cases is that learning only takes places within the four walls of the classroom with the teacher being at the helm. ESD through inquiry requires teachers to become facilitators, allowing students to make the connection with the environment

where they develop the capabilities of critical thinkers, lifelong learners, agents of change, and problem solvers (Tilbury, 2011). Hudspith and Jenkins (2001) and Wals (2011) concur that both ESD and IBL are student-led learning approaches that create the shift from students being passive learners to becoming active participants. Learning ESD through the student-led pedagogy of IBL, therefore enables students to "possess a willingness to examine and change personal lifestyles to secure a sustainable future" (Gough & Sharpley, 2005, p. 10)

4.1.6 Summary

The teachers interviewed highlighted the general importance of educating for sustainable development. Teachers do see this as beneficial for students, the global community and as a viable solution for tackling the environmental degradation that we currently encounter. Teacher education in ESD is integral for developing understandings about sustainability and sustainable development, as well as how to effectively use the curriculum to integrate these ideas in the classroom. The teachers also advocate inquiry-based learning as an effective student-led pedagogy that is instrumental in helping students make those connections that will produce changes in attitudes and behaviors to spur actions that support sustainability.

Teachers interviewed expressed the belief that ESD for students in elementary schools is not a trial and error formula, but rather that it is essential as children are set to inherit the planet. They also believe that students need to be educated to occupy a mindset to effect change in order to experience a better quality of life now and in the future.

Teacher interviewees also revealed that there are challenges and barriers that teachers encounter as they try to integrate ESD through IBL. These challenges include time constraints, lack of administrative support and support from colleagues, lack of training and fear in releasing power to students in the teaching-learning process. The teachers believe that these challenges must be

tackled with immediacy if we want education for sustainability to result in achievement of the goals

put forward by UNESCO (2005) during the Decade for Education for Sustainable Development.

4.2 Document Analysis

4.2.1 Introduction

In order to determine whether the Saskatchewan Public Schools Curriculum does facilitate the infusion and integration of Education for Sustainable Development (ESD) through inquiry, document analysis was conducted on four grades six curricula namely English Language Arts, Mathematics, Social Studies and Science (2009). The curricula are written and compiled by the Saskatchewan Ministry of Education Curriculum and E-Learning Science and Technology Unit. The curriculum is an educational guide for teachers in the classroom which provides teachers with a planned architecture to deliver quality education.

Observation of each curriculum shows that they are segmented similarly. Below is a brief explanation of each section as portrayed in the curricula:

Introduction: This provides a brief overview of the purpose of each curriculum as it relates to the outcomes and indicators that students are expected to achieve at the end of Grade 6. This section also tells the time allotment for each subject per week for the entire year.

Core Curriculum: The Goals of Education for Saskatchewan students is emphasized as necessary in providing quality education to all students to ensure that they are able to achieve their career paths after leaving school.

Broad Areas of Learning (BAL): This section, reflective of the goals of education, indicates the knowledge, skills, and attitudes that students should achieve through studies in each subject area between kindergarten and grade 12. . The Broad Areas of Learning include: Developing Lifelong Learners, Developing a Sense of Self, and Developing Engaged Citizens. These three Broad Areas of Learning are committed to students embracing a positive disposition towards learning, which

aids in the development of their identity which will strengthen their engagement and interaction with others.

Cross-curricular Competencies: This section is comprised of a set of interconnected intellectual, personal and social skills that enable deeper learning in each subject area. Students, therefore, are to Develop Thinking habits, Develop Identity and Interdependence, Develop Literacies, and Develop Social Responsibilities. These competencies help to present a holistic approach to teaching and learning as students are able to make the connection between their own experiences and what is happening around them and the wider world.

Aim and Goals: Each of the curricula outlines the aims and measurable goals of the subject area which are to be achieved by students by the end of grade 12. Figure (3) below offers a visual representation of the goals to be achieved in each curriculum.

Figure 4. 2 Goals to be achieved by each curriculum

- STST Interrelationships
- Scientific Knowledge
- Scientific and Technological Knowledge
- Scientific Habits of Mind

- Interaction and Interdependence
- Dynamic Relationships
- Power and Authority
- Resources and Wealth

Science

Social Studies

Mathematic

English Language Arts

- Logical thinking
- Number Sense
- Spatial Sense
- Human Endeavour

- Comprehend and Respond
- Compose and Create
- Assess andReflect

Inquiry: Each of the curricula has a section that focuses on inquiry, which is the pedagogical approach of choice that drives the indicators and outcomes. This section, in each of the curriculum guides, outlines the benefits to students who are engaged in inquiry. It also documents the form that it may be personified in each subject area and the processes of the inquiry approach.

Teaching an Effective Subject Program: This section within the curricula describes how teachers can make each curriculum, "purposeful, dynamic, fulfilling and authentic" (*English Language Arts 6*, 2009, p. 7). This section of the curricula provides some guidelines to help teachers navigate through each curriculum, thereby enhancing the achievement of the goals of each subject area. Guidance given here correlates with achieving the core curriculum goals and fostering the Cross-Curricular Competencies for each subject area.

Outcomes and Indicators: Each of the subject areas present the general goals to be achieved and these are followed by the outcomes and indicators specific to a grade level. The outcomes describe essential learnings that students should achieve and be able to demonstrate at the end of the learning experience. Indicators, on the other hand, are means of evaluating how well the outcomes have been achieved. This section of the curriculum also guides the assessment and evaluation of student learning at each grade level and offers a broad understanding of how the goals to be achieved are related to other areas of study. These indicators aid in making learning integrated and transdisciplinary, thereby fostering a more profound understanding. For example, in the mathematics curriculum, it describes at length how this subject can be connected with Arts Education, Career Education, English Language Arts, Health Education, Physical Education, Science, and Social Studies.

In analyzing the four curricula, the six elements related to Sustainability and ESD based on their definition as outlined below were used to comb through the curriculum. It was found that all six elements reflected that same meaning throughout the four curricula analyzed:

These six themes include:

- Citizenship and Stewardship: Students are becoming mindful of how their actions negatively impact the environment and their obligation towards caring for the earth in which they exist.

- Future Looking Outlook: Developing a predisposition to think critically about the imprint of human activities on the environment now and the future.

- Interdependency: Creating balance through the use of the social, economic and environmental resources to improve and preserve the quality of life for the now and future generations.

- Equity, Human Rights and Social Justice: Individuals having equal and fair opportunities to utilize the earth's resources; and the right to live in a healthy environment now and for the future.

- Needs and Rights of Future Generations: Students understand that future generations should be able to live a high quality of life based on the sustainable use of the earth's resources now.

- Action for Sustainability: Students are developing the capabilities and impetus to take individual and collective actives to solve environmental problems faced in order to create a more sustainable world for now and future generations.

An analysis was also done to examine the inquiry-based learning approach as observed in each curriculum.

4.2.2 Presentation of Findings

Findings from each curriculum will be presented in a table form. This is done to present a clear vision of the presence of each of the elements of ESD concerning each significant segment that constitute the curricula. In order to illustrate the presence of the elements of ESD as previously outlined, the following words and associated numbers are used to describe their presence and the strength of their presence, as demonstrated in the table below:

Table 4. 2 Legend to describe the presence of the elements of Education for Sustainable Development in each curriculum

Key:	Strong 3	Intermediate 2	Weak 1	Not Visible 0

The word "Strong", represented by the digit 3, suggests that the element analyzed is clearly visible, and heavily emphasized in the entirety of the particular component part of the curriculum. "Intermediate", represented by the digit 2, demonstrates a moderate presence, meaning it is only seen in a few parts of the entire segment of the curriculum analyzed. "Weak", represented by the digit 1, is indicative that the element of ESD is at least once in the component part of the curriculum evaluated. "Not visible", represented by the digit 0, clearly indicates that the element of ESD analyzed was not identified in any precise way.

A table for each curriculum is included below which will highlight examples to demonstrate where the element evaluated is noticeable in the particular subject area guide.

4.2.2.1 Social Studies Curriculum

A close examination of the definition and explanations given concerning the advantages of Social Studies at this age is in tandem with elements of ESD which indicates that this curriculum

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is designed to focus on students making connections to their environment, as well as firmly

understanding the relationship between the different dimensions of sustainability.

Table 4. 3 Summary of the ESD elements as found in the Social Studies 6 *(2009) curriculum*

ESD Elements	Introduction	Broad Areas of Learning	Cross-curricular Competencies	Aim and Goals	An Effective Social Studies Education Program	Outcomes and Indicators
Citizenship and Stewardship	3	3	3	3	3	3
Future Looking Outlook	3	3	3	3	3	3
Actions for Sustainability	3	2	2	2	2	2
Equity, Human Rights and Social Justice	0	2	1	1	1	2
Interdependence	3	1	2	2	2	2
Needs and Rights of Future Generations	0	0	1	0	0	0
Key:	Strong 3		Intermediate 2		Weak 1	Not Visible 0

Table 5 above provides a visual presentation of the spread of the elements of ESD as seen

throughout the different sections of the *Social Studies 6* (2009) curriculum. It is quite evident that

the elements of Citizenship and Stewardship has a strong presence in all the sections of this

curriculum. The elements of Actions for Sustainability and Interdependence are similar in nature

relating to their visibility throughout the *Social Studies 6* (2009) curriculum, except for the element

of Interdependence that was only faintly seen in the BAL of the curriculum.

1) Citizenship and Stewardship

The element of Citizenship and Stewardship in the Introduction of the *Social Studies 6*, (2009) curriculum articulates from the onset that students will learn to become eco-citizens, protecting their environment through small individual actions. This is evident from the excerpt below:

Social Studies [will] provide students with the opportunities to make connections between their own and other's communities, cultures, and environments, and to take action in relevant and meaningful ways that give students a sense of accomplishment and a belief that they can make a difference. (p.1)

The element of Citizenship and Stewardship is tightly embedded in the BALs which reflect the Saskatchewan's Goals of Education. These Broad Areas of Learning (BALs) are found to be incubators for developing students possessing the "ability and willingness to contribute to collective well-being through personal and collective decisions and actions" (*Social Studies 6*, 2009, p. 3). Is was also observed that the BALs are also supportive of the element of Citizenship and Stewardship in that they promote an understanding of self and relationship with others and communities which engenders the development of positive attitudes and values, which is the core of ESD for sustainable changes to occur. This area of learning assists this process by ensuring that what is taught, and the instructions given "clearly establish connections between what is taught, and students' current lives and situations, supporting meaningful connections between the students' prior knowledge and experiences and newly acquired knowledge and experiences (*Social Studies 6*, 2009, p. 2).

Observance of the strong presence of the element of Citizenship and Stewardship is also noticeable in the Core-curricula Competencies. It was evaluated that students are brought to acknowledge and appreciate the mutualistic relationship that exists between humans and their

surroundings. This form of knowledge will bring students to adopt an attitude of stewardship which is reflective of their "willingness to adapt one's lifestyle in order to contribute to the well-being of the environment" (*Social Studies 6*, 2009, p. 4). It can, therefore, be assumed, that such learning in social studies will result in students taking responsible actions and making decisions that will mitigate any impact on the quality of life for the future.

Analysis of the Aims and Outcomes does provide evidence that its design provides students with the opportunity to "analyze the dynamic relationships of people with land, environments, events, and ideas as they have affected the past, shape the present, and influence the future" (*Social Studies 6*, 2009, p. 6). This dynamic relationship goal is also visible in the section on the *Studies Studies 6* (2009) curriculum titled, Teaching Social Studies. From this section, it can be surmised that students learn to "develop a consciousness and sense of stewardship for the land, as well as an understanding of the principles of sustainability" (*Social Studies 6*, 2009, p. 8). Additionally, they are also engaged in learning which fosters the "develop[ment] of a global consciousness with respect to the human condition and world issues" (*Social Studies 6*, 2009, p. 8). Such consciousness becomes necessary if students are to become active, responsible participants towards sustainable changes as they gain an extensive view of the inherent value of the earth we occupy.

Surveillance of the Outcomes and Indicators of Grade 6 in relation to the element of Citizenship and Stewardship shows that they provide students with the opportunities to examine the interplay between the dynamic relationship of humans and the earth. Furthermore, students are also able to evaluate the environmental, social and economic decisions made, and the consequences these decisions have on the health and well-being of themselves and citizens in their communities and the broader global community. This is visible from the example below:

Goal: To analyze the dynamic relationships of people with land, environments, events, and ideas as they have affected the past, shape the present, and influence the future (DR). (*Social Studies 6*, 2009, p. 21)

2) Future Looking Outlook

As shown in Table 5, this element is commensurate in visibility to the element of Citizenship and Stewardship. In the BAL section, the focus is to develop lifelong learners with a "spirit of inquiry [for] the pursuit of knowledge" (*Social Studies 6*, 2009, p. 2). In assessing the Cross-curricular Competencies, it is found that the element of Future Looking Outlook aids students to develop identity and interpersonal relationships in their communities, thereby providing the foundation for students to see themselves as valuable members who can effect change towards a sustainable way of life. This is seen from the following excerpt from the curriculum:

Focusing on identity and interdependence strengthens students' understanding of who they are as individuals and as social beings. As students reflect on and express who they are, they build upon their identities as contributing members of interdependent groups and communities (*Social Studies 6*, 2009, p. 4).

From the analysis of this element, it is clear that students gaining an understanding of who they are and their dependence on the environment will result in forged partnership with each other to re-evaluate their actions making concerted actions to achieve a better quality of life.

An assessment of the Aims and Goals shows that the element of Forward-Looking Outlook is designed to foster students who can think critically to "engage in problem-solving and conflict resolution with an awareness of the ethical consequences of decision making" (*Social Studies 6*, 2009, p. 8). Thus, it can be argued that acquisition of these skills aids in the development of students becoming responsible citizens cognizant of their capacity to effect change towards a

sustainable livelihood. The teaching and learning principles that guide this social studies curriculum makes it incumbent on teachers to provide "instruction us[ing] a variety of strategies to encourage students to examine, clarify, and reflect upon their values and viewpoints, as well as to consider and discuss several perspectives regarding a variety of concepts, issues, and topics" (*Social Studies 6*, 2009, p. 10). These instructions strengthen students' ability to think critically and to make sense even as they deal with controversial issues such as sustainability and sustainable development in an effort to attain a better quality of life. Observation of the Outcomes and Indicators share similarity to what is seen from the element of Citizenship and Stewardship.

3) Actions for Sustainability

In the Introduction of the social studies curriculum, the element of Actions for Sustainability is visible as students are encouraged to "use the understandings developed to explore and clarify values, discuss issues, question and investigate the world, solve problems, make decisions, and interact with others" (*Social Studies 6*, 2009, p. 1). These measurable actions as seen in this element become more potent towards sustainability when student become engaged in their communities.

In the BALs, the element of Actions for Sustainability does not possess a strong presence but does posit change that will result in students taking actions for the "collective well-being" (*Social Studies 6*, 2009, p. 3) of humanity. The Cross-curricula Competencies section of the curriculum from the analysis concerning the element of Action for Sustainability is only moderately visible. This element, however, does seek to develop students to become advocates who are aware of the world in which they live. Although this element is moderately seen in the Aims and Goals section of the curriculum, there is the use of measurable verbs such as "examine, analyse and investigate" (*Social Studies 6*, 2009, p. 6) which commence each goal. These measurable verbs do depict

critical thinking, as well as action-oriented agenda to provide experiences that will cultivate deep understanding thereby positioning students to take action for sustainability. An assessment of the Teaching of Social Studies section in the curriculum revealed that the element in review had a moderate presence. It was found that its presence did emphasize students developing the "values and attitudes, knowledge and understanding, and skills and processes" (*Social Studies 6*, 2009, p.7) to become active participants to effect change. This does affirm the school of thought, of pensiveness in thoughts which changes students' values and attitudes to take and demand sustainable actions.

4) Equity, Human Rights and Social Justice

This element is not visible in the Introduction of the social studies curriculum, nor does it have a strong presence in the BALs. An analysis of the BALs reveals that this element embraces the tenets of ESD by teaching students the importance of tolerance, empathy, and respect. These according to literature effect changes in values and attitudes, which allows thought and "appreciation of the rights [and] privileges" (*Social Studies 6*, 2009, p. 3) of other. This, therefore, provides the impetus for responsible citizenship and stewardship to be activated.

This element from an analysis of both the Cross-curricula Competencies and the Aims and Goals, has a weak presence. However, as seen from the Cross-curricular Competencies, the element of Equity, Human Rights and Social Justice is focused on students being engaged in communitarian thinking to "value the diversity, respect the dignity, and support the equality of all human beings" (*Social Studies 6*, 2009, p. 5) as well as to "identify and speak out against intolerance, prejudice, racism, and other forms of discrimination" (*Social Studies 6*, 2009, p. 6). Hence, the notion of social equity is allowed to permeate students' mind to foster changes in values and attitudes which is a

compelling focal point for ESD in relation to students becoming agents of change towards achieving a sustainable future.

As it relates to the Teaching of Social Studies section of the curriculum, the element of Equity, Human Rights and Social Justice, is seen where students are to be focused to "value the diversity, respect the dignity, and support the equality of all human beings" (*Social Studies 6*, 2009, p. 8).

5) Interdependence

This element is quite conspicuous from the Introduction section of the Social Studies curriculum. Analysis of the definition of social studies taken from the Introduction shows that it constitutes the interlinkage of the three pillars of sustainability, as well as to bring students into an understanding of the usage of technology in sustainability. This element does manifest itself moderately in all the other sections of the *Social Studies 6* (2009) curriculum. For example, from the Cross-curricula Competencies section of the curriculum, the element of Interdependence is noticeable in fostering students to become "[appreciative] of the dependence of human beings upon nature and respect for the natural environment" (*Social Studies 6*, 2009, p. 4). Whereas, from the Aims and Goals of the curriculum, this element is seen as providing students with the opportunity to "analyze the dynamic relationships of people with land, environments, events, and ideas as they have affected the past, shape the present, and influence the future" (*Social Studies 6*, 2009, p. 10). In the Teaching of Social Studies section of the curriculum, it is found that students learning how to "understand geographic concepts and skills, and that humans exist in a dynamic relationship with the natural environment" (*Social Studies 6*, 2009, p. 8) is reflective of the element of Interdependence. In reviewing the Outcomes and the Indicators evidence of examples of the element of Interdependence is similar to that seen from the elements of Citizenship and Stewardship and Forward-Looking Outlook.

6) Needs and Rights of Future Generations

This element, based on the analysis, is not conspicuous in most of the sections of the *Social Studies 6* (2009) curriculum, except for in the Cross-curricular Competencies where it has a weak presence.

7) Inquiry-Based Learning Approach

Inquiry-Based Learning is the overarching approach that is used in this social studies curriculum, making it dynamic and adding cohesiveness to the elements of ESD that are evident. This inquiry approach as outlined "builds on students' inherent sense of curiosity and wonders" (*Social Studies 6*, 2009, p. 15). Thus, it is seen where questioning is used to navigate the process into sustainable issues and topics. The social studies curriculum posits that "questions give students some initial direction for uncovering the understandings associated with a topic" (*Social Studies 6*, 2009, p.17). As a result, students are able to assess diverse solutions and possibilities. The importance of the inquiry approach to the social studies curriculum in relation to the six visual elements is the "consideration of the beliefs, values, and implications of various alternatives" (*Social Studies 6*, 2009, p. 18). Consequently, students, it is understood are allowed to "weigh priorities, predicting consequences, negotiating compromises, and making decisions or exploring possibilities" (*Social Studies 6*, 2009, p. 18) which are essential to the teaching of ESD.

4.2.2.2 Science Curriculum

Examination of the *Science 6* (2009) curriculum reveals that it provides a landscape where science and technology are synthesized into an action-based plan to encourage mindful, sustainable thinking and actions. Table 6 below illustrates the weight of the spread of the elements of Education

for Sustainable Development (ESD) throughout the different sections of the *Science 6* (2009) curriculum.

Table 4. 4 Summary of the ESD elements as found in the Science 6 (2009) curriculum

ESD Elements	Introduction	Broad Areas of Learning	Cross-curricular Competencies	Aim and Goals	An Effective Science Education Program	Outcomes and Indicators
Citizenship and Stewardship	0	1	3	2	2	3
Future Looking Outlook	0	1	3	2	3	3
Actions for Sustainability	0	1	1	2	3	0
Equity, Human Rights and Social Justice	0	1	1	1	1	0
Interdependence	0	2	2	2	0	0
Needs and Rights of Future Generations	0	0	0	0	1	0
Key:	Strong 3		Intermediate 2		Weak 1	Not Visible 0

Analysis conducted on this curriculum showed that not all the elements of ESD were accentuated in the same proportion throughout the different sections of the curriculum examined.

1) Citizenship and Stewardship

This element was not observed in the Introduction and has a feeble presence throughout the Core Curriculum section of the curriculum. From the BAL section, it is observed that students learn how to become lifelong learners, who are given the opportunities to "act on their personal responsibility to understand and, respect their place in the natural and constructed world, and make personal decisions that contribute to living in harmony with others and the natural world" (*Science*

6, 2009, p. 4). It is noticeable that students learning to be conscious of their responsibilities for nature is directed through scientific and technological perspectives. In the Cross-curricular Competencies of the *Science 6* (2009) curriculum, it is seen where the element of Citizenship and Stewardship is moderately emphasized. Here it is observed that learning experiences offered, enables students to connect with the "interrelationships among science, technology, society, and the environment (STSE) that will affect their personal lives, their careers, and their future" (*Science 6*, 2009, p. 6). Such connections and understanding do substantiate the presence of the element of Citizenship and Stewardship in this section of the curriculum.

The section of the science curriculum titled, "An Effective Science Education Program" is comparable to the section of "Teaching Social Studies" in the *Social Studies 6* (2009) curriculum. The element of Citizenship and Stewardship observed here, seeks to fortify students with attitudes towards sustainability and stewardship that will increase their responsibility for making choices that reflect those ideas. Hence, "students will be encouraged to develop responsibility in the application of science and technology in relation to society and the natural environment. *(Science 6*, 2009, p. 17). From the Outcomes and Indicators viewed, there was a strong presence of the element of Citizenship and Stewardship, as presented in the example below:

Outcome: DL6.1 Recognize, describe, and appreciate the diversity of living things in local and other ecosystems, and explore related careers. (*Science 6*, 2009, p. 30)

Indicator: Show respect for other people, living things, and the environment when observing ecosystems. (*Science 6*, 2009, p. 30)

2) Future Looking Outlook

This element is not visible in the Introduction of the *Science 6* (2009) curriculum. In the Broad Areas of Learning, this element is weakly represented. Its presence does, however, seeks to garner in students a reflective disposition about their personal decisions, and how these impact "living in harmony with others and the natural world" (*Science 6*, 2009, p. 4). Throughout the Cross-curricular Competencies section of the curriculum, this element places significant emphasis on the relationship between critical thinking and actions towards sustainability. Hence, it can be assumed that students learning critical thinking will be able to examine the interconnectivity "among living things within local, national, and global environments and consider the impact of individual decisions on those environments" (*Science 6*, 2009, p. 5).

Observation of the Aims and Goals of the *Science 6* (2009) curriculum, shows that it does not manifest itself strongly throughout this section. Focus is seen here as:

> Students will develop the skills required for scientific and technological inquiry, problem-solving, and communicating; for working collaboratively; and for making informed decisions. (*Science 6*, 2009, p. 6)

There is a strong presence of the element of Forward-Looking Outlook in the Effective Science Program of the curriculum. It is found that science activities will enable students to become actively involved in "observation, replication, interpretation of evidence, and consensus making" (*Science 6*, 2009, p. 12). These intellectual dispositions are reflective of the element of Forward-Looking Outlook in scrutinizing how the amalgamation of science, technology, and indigenous knowledge can inform and empower decision making. The example below as observed does provide evidence of the presence of this element in the Outcomes and Indicators section of the *Science 6* (2009) curriculum:

Outcome: EL6.1 Assess personal, societal, economic, and environmental impacts of electricity use in Saskatchewan and propose actions to reduce those impacts.

3) Actions for Sustainability

It is observed that this element articulates the integration of science and technology as compatible partners to achieve sustainability for now and for the future. As observed, this element is undetectable in the Introduction and showcases a weak representation of itself in the BAL. The element of Actions for Sustainability as seen from the BAL will engage students to make "personal decisions that contribute to living in harmony with others and the natural world" (*Science 6*, 2009, p. 4). Similarly, in the Cross-curricular Competencies, the element of Actions for Sustainability is observed in minuscule quantity. Observation of its presence seeks to motivate students to participate in "moral reasoning processes, engaging in communitarian thinking and dialogue, and taking social action" (*Science 6*, 2009, p. 5).

Noticeable in the Aims and Goals of the *Science 6* (2009) curriculum, is that the element of Actions for Sustainability is moderately featured in this section. It was observed however that this element does seek to "Develop Attitudes that Support Scientific Habits of Mind" as seen from the example outlined below:

Students will develop attitudes that support the responsible acquisition and application of scientific, technological, and Indigenous knowledge to the mutual benefit of self, society, and the environment. (*Science 6*, 2009, p. 6)

In the section entitled An Effective Science Education Program, the analysis revealed that the element of Actions for Sustainability is tightly embedded in this section of the curriculum. It is observed that technology and science are promoted as being integral in "solving practical problems that arise from human/social needs, particularly the need to adapt to the environment and to fuel a

nation's economy" (*Science 6*, 2009, p.12). Observation of the Outcomes and Indicators did not show any visible presence of this element of ESD.

4) Equity, Human Rights and Social Justice

Analysis of all the areas of the sections of the *Science 6* (2009) curriculum with the ESD element of Equity, Human Rights and Social Justice revealed that either this element is not visible, or it is weakly manifested in the different sections analyzed. This element is not detectable both in the Introduction and the Outcomes and Indicators. In all the other areas, its presence is minuscule. The little presence of the element of Equity, Human Rights and Social Justice as analyzed from the BAL does affirm the explicit goals of sustainability, that is "living in harmony with others and the natural world" (*Science 6*, 2009, p. 4). An examination of the Cross-curricular Competencies revealed that the element of Equity, Human Rights and Social Justice requires students, to use their moral reasoning process to think as they interact with their local and global community. This element of Equity, Human Rights and Social Justice does encourage students to ensure the importance of corporate social responsibility in the use of scientific and technological innovations to improve quality of life.

Analysis of the Aims and Goals revealed that this element advocates "support [for] the responsible acquisition and application of scientific, technological, and Indigenous knowledge to the mutual benefit of self, society, and the environment" (*Science 6*, 2009, p. 6). It can, therefore, be deduced that students need to possess more astute consideration of the three interconnecting pillars of sustainable development when making decisions for the benefit of all. Examination of the Effective Science Education Program shows that the element of Equity, Human Rights and Social Justice is more directed towards changing attitudes and perception. Hence, it is observed that through science content, students learn an appreciation for the diverse cultural worldview,

"scientifically literate students begin to appreciate the worldviews and belief systems fundamental to science and to Indigenous knowledge" *(Science 6*, 2009, p. 21). This helps to promote equality in considering the rights and privileges that must be extended to all humanity. Thus, scientifically literate students will begin to appreciate the worldviews and belief systems fundamental to science and Indigenous knowledge.

5) **Interdependence**

Observation of the Introduction revealed that the element of Interdependence is not visible. Concerning the BAL, it is quite noticeable that this element does not have a significant presence. The element of Interdependence is demonstrative where students are provided with the opportunities to examine the interconnective that exist between "science, technology, society, and the environment" (*Science 6*, 2009, p.4). An analysis of the Cross-curricular Competencies reveals that through science, students learn to construe the world they live in by exploring the interrelationship between themselves and the natural world. This is reflective of the element of Interdependence.

Like the Cross-curricular Competencies, the element of Interdependence does not possess a strong presence in the Aim and Goals of the *Science 6* (2009). This element is observed as allowing students to "understand the interrelationships among science, technology, society, and the environment (STSE) that will affect their personal lives, their careers, and their future" (p. 7). Careful analysis of both the Effective Science Teaching Program and the Outcomes and Indicators of the *Science 6* (2009) curriculum did not reveal the presence of the element of Interdependence.

6) Needs and Rights of Future Generations

Analysis of the *Science 6* (2009) Curriculum in relation to the element of Needs and Rights of Future Generations reveal that this element is not very pronounced or visible in all sections of the curriculum. This element of Needs and Rights of Future Generations is only faintly visible in the Effective Science Education Program of the curriculum where students learn to develop "attitudes, values, and ethics that inform a responsible use of science and technology for the mutual benefit of self, society, and the environment" (*Science 6*, 2009, p. 17).

7) Inquiry-Based Approach

The inquiry process is the driving force for the *Science 6* (2009) curriculum. From the analysis of the Broad Areas of Learning, students becoming lifelong learners is fostered through exploration of their "natural curiosity about the natural and constructed world which provides the motivation to discover and explore their personal interests more deeply" (*Science 6*, 2009, p. 4). The verb "explore" is used several times in this section of the curriculum which is synonymous with inquiry. Additionally, it is observed where students are not only afforded the opportunity to explore, but they get involved to "analyze, evaluate and synthesize" (*Science 6*, 2009, p. 5)

Like the *Social Studies 6* (2009) curriculum, questioning forms a considerable part of the *Science 6* (2009) curriculum and this assists students to garner "deep understanding [to] help grasp the important disciplinary or transdisciplinary ideas that are situated at the core of a particular curricular focus or context" (*Science 6*, 2009, p. 9). Assessment of the inquiry process as outlined in this curriculum demonstrates that students are to learn the approach of initiating and planning, executing the plan to garner and record data. These data are further analyzed, and interpretations made which are debated for acceptance or rejected. This is enfolded through communication and teamwork. This inquiry approach fosters logical and critical thinking among students.

The outcomes for the indicators are so structured for the use of students to be engaged through the inquiry approach.

4.2.2.3 English Language Arts (EAL)

This curriculum is so structured to develop students' language skills to express themselves and improve communication both orally and written.

Table 4. 5 Summary of the ESD elements as found in the English Language Arts 6 (2009) Curriculum

ESD Elements	Introduction	Broad Areas of Learning	Cross-curricular Competencies	Aim and Goals	An Effective EAL Education Program	Outcomes and Indicators
Citizenship and Stewardship	0	0	2	0	3	0
Future Looking Outlook	0	0	2	3	3	0
Actions for Sustainability	0	1	1	3	3	0
Equity, Human Rights and Social Justice	0	0	2	0	1	0
Interdependence	0	0	2	0	2	0
Needs and Rights of Future Generations	0	0	1	0	1	0
Key	Strong 3		Intermediate 2	Weak 1		Not Visible 0

1) Citizenship and Stewardship

Analysis of the *English Language Arts 6* (2009) curriculum in relation to the ESD element of Citizenship and Stewardship, revealed that this element is not present in the Introduction as well as the BALs. From an examination of the Cross-curricular Competencies, it was found that the element of Citizenship and Stewardship was moderately featured throughout the curriculum. Its

presence here does seek to equip students with the communication language skills to "explore social responsibility, diversity, sustainability, and efficacy" (*English Language Arts 6*, 2009, p. 3). It can, therefore, be concluded that students through English language will learn to become expressive of and to widen exposure to the issues mentioned at this age level. Thus, the *English Language Arts 6* (2009)) curriculum appears to be designed to evoke social cohesion towards personal and societal care and action toward sustainability.

Analysis of the Aims and Goals as well as the Outcomes and Indicators show that the element of Citizenship and Stewardship is not given any emphasis. On the contrary, observation of the Effective English Language Arts Program shows that this element has a weak presence and manifests itself as shown from the example below:

Social, cultural, and historical focus or context gives students opportunities to explore relationships with others, community, culture, customs, other ways of knowing, national and international events and issues, and the history of humanity. What are my rights and responsibilities in communities, cultures, and economies? How and who am I in relation to communities, cultures, and economies? How am I defined by these relationships? (*English Language Arts 6*, 2009, p. 12)

It can, therefore, be concluded, that investigation of these big ideas manifest what Citizens and Stewardship entails and enable a better understanding of the bigger picture of sustainability. Students who are cognizant of their rights and responsibilities are more inclined to raise public awareness concerning human relations with the three pillars of sustainability.

2) Future Looking Outlook

This element as illustrated in Table 7 is not noticeable in the Introduction, BALs and the Outcomes and Indicators. Evaluation of the Cross-curricular Competencies shows that this section

of the curriculum does not place a significant emphasis on the element of Future-Looking Outlook. This is evident whereby students can use language to articulate ideas. These ideas it is seen does spurn from students studying and exploring "issues of identity, social responsibility, diversity, sustainability" (*English Language Arts 6*, 2009, p. 3).

As displayed in Table 7, the Aim and Goals of the *English Language Arts 6* (2009) curriculum does place a strong emphasis on the element of Future Looking Outlook. This is observed as students learn how to "read, comprehend, and respond to a range of contemporary and traditional grade-level texts in a variety of forms (*English Language Arts 6*, 2009, p. 4). Hence, students are given the opportunity to compose and create responses based on text read. Lastly, students through self-examination are able to assess their command of the language for clarity and efficiency. Students being able to do this will foster confidence for them to use their language to promote change.

Examination of the section of the curriculum entitled, An Effective English Language Arts Program shows that the Forward-Looking Outlook element of ESD is present. This curriculum through English language provides "meaningful and relevant contexts for teaching and learning including connections to students' experiences, knowledge, and personal and cultural identity" (*English Language Arts 6*, 2009, p. 4). As a result, it can be inferred that students will be able to make connections to sustainable issues to use language as a tool to galvanize dialogue and action to ensure harmony between human activities and a healthy environment.

3) **Actions for Sustainability**

Reviewing the *English Language Arts 6* (2009) curriculum, it was observed that the element of Actions for Sustainability is non-existence both in the Introduction and the Outcomes and Indicators section of the curriculum. The element of Actions for Sustainability in relation to the

BAL is weakly represented but is seen where it gives students a "sense of agency" (*English Language Arts 6*, 2009, p. 2). Hence, students are provided with the vocabulary to motivate and elicit actions towards sustainability. It can, therefore, be deduced that through discourse they can engage in negotiations and problem-solving solutions for the care and protection of their community.

From observation of the Cross-curricular Competencies, the element of Actions for Sustainability does not have a significant presence in this section of the curriculum as shown from Table 7. It is observed that students are encouraged to use English language to articulate "moral reasoning" (*English Language Arts 6*, 2009, p. 4). Moral reasoning is a form of social responsibility, and an effective course of action that can be taken towards attaining environmental protection. From the Effective English Language Arts section of the curriculum, it is observed that students are enabled to "become effective self-directed, self-regulated, strategic, and collaborative learners to meet the demands of personal, social, work, and global life in the 21st century" (*English Language Arts 6*, 2009, p. 7). Students, it is observed are engaged to apply knowledge to the world, rather than just to become repositories of it.

4) Equity, Human Rights and Social Justice

The presence of this element does not have a strong presence throughout the *English Language Arts 6* (2009) curriculum as illustrated in Table 7. This element of Equity, Human Rights and Social Justice is not visible in the Introduction, BAL, Aims and Goals, and the Outcomes and Indicators section of the curriculum. It does, however, possess a moderate presence from the Cross-curricular Competencies section of the curriculum. From this section of the curriculum, it is found that through English language, students are taught to intelligible speak of the dignity and worth of each human being on planet earth. English language from this section of the curriculum, provides a

platform whereby students can use language to convey a message of equal rights and justice for all as they learn about valuing and caring about oneself and the environment in relation to others and their well-being (*English Language Arts 6*, 2009).

As seen in the Effective Language Arts section of the curriculum, the element of Equity, Human Rights and Social Justice does have not a very significant presence as shown in Table 7. This element allows students to become reflective of "self and life, and on their beliefs and values and those of their society" (*English Language Arts 6*, 2009, p. 15). Students from such reflections are positioned to examine how their values and beliefs do reconstruct and create an imbalance for harmonious living with others and for those in the future.

5) Interdependence

Again, similar to the element of Equity, Human Rights and Social Justice, the element of Interdependence is not conspicuous from the Introduction, BAL, Aims and Goals and the Outcomes and Indicators section of the curriculum. Analysis of the Cross-curricular Competencies as in Table 7, does have a moderate presence in the curriculum. From this section of the curriculum, the element of Interdependence is evident whereby students can use English language to have coherent discussions concerning the "social, economic and environmental interdependence and sustainability" (*English Language Arts 6*, 2009, p. 3). Such eloquence is necessary if students are to develop agency to become agents to disseminate information to community members in an understandable and persuasive manner to effect change.

In the section of the curriculum that speaks to An Effective English Language Arts Program, the element of Interdependence is reflected through an environmental and technological focus. Here English Language Arts provides a structured means by which students can develop an understanding of the connection between the natural and constructed world. From this section of

the curriculum, it is seen where teachers allow students to become expressive of ideas in order to explore questions and wonders concerning "How do I describe, analyze, and shape the world around me? How does that natural and technological world affect and shape me?" (*English Language Arts 6*, 2009, p. 13).

6) Needs and Rights of Future Generations

This element is sparsely seen throughout the curriculum and is only visible in the Cross-curricular Competencies and Effective English Language Arts Program of the curriculum. As observed from the Cross-curriculum Competencies of the curriculum, this element of ESD is so structured to assist students to consider the "well-being of self, others, and the natural world" (*English Language Arts 6*, 2009, p. 4). English language is used as the medium through which this is facilitated through discussions.

Analysis of the An Effective English Language Arts Program reveals that it provides authentic, meaningful learning context for students to experience the element of the Needs and Rights of Future Generations. Through literary context students are provided with "opportunities to use their intuition and imagination to explore alternative worlds and possibilities" (*English Language Arts 6*, 2009, p. 12). Students through imagination learn empathy, to be considerate of those who will inherit the earth. Students it is seen are provided with opportunities to use English language to convey these experiences orally, in written form or engage in debates. These activities enable students to view English language as an essential tool to convey the Needs and Rights of Future Generations.

7) Inquiry Learning Approach

The *English Language Arts 6* (2009) curriculum from observation is inquiry-based focused as students "use their language and thinking skills to explore a range of topics, issues, and themes"

(*English Language Arts 6*, 2009, p. 3). This inquiry focus helps students develop their critical and creative thinking skills to strengthen their use of English language for communication. It is observed that the aims and goals of this curriculum are formulated around inquiry questions which encourages students to be active participants in the learning process. It is fair to say from observations made, that students are encouraged to ask questions, which open the door for inquiry to take place.

It is found that this curriculum has moved away from the conventional form of teaching to embrace a form of pedagogical approach that is more student-led by way of IBL. This is observed from the presence of a multi-genre inquiry unit that teachers must include when teaching English language in their classroom. This multi-genre inquiry unit is centered around students " finding out" the answers to a question or questions that the students have about the theme or topic and then using the inquiry process to guide their activities in the unit" (*English Language Arts 6*, 2009, p. 14). Students, therefore, belong lifelong learners while engaging their natural curiosity in the process.

The Aims and Goals of the *English Language Arts 6* (2009) Curriculum engages students through questioning. It is observed that these questions form the inquiry process which is not "linear or lock-step, but is flexible and recursive" (*English Language Arts 6*, 2009, p. 17). Hence, students are able to attend to new curiosities anywhere along the learning process. Analysis of the Outcomes and Indicators do confirm what is seen from the other sections of the curriculum. The Outcomes are achieved by students doing a number of inquiry-based activities such as creating, analyzing, drawing conclusions, generating questions, discussing, and considering. This inquiry approach instructs the achievement of all the six elements viewed in this curriculum.

4.2.2.4 Mathematics

This curriculum requires students to be exposed to its content for 210 minutes each week for the whole year. This curriculum is structured for continuity, as students improve on the "number sense, spatial sense, logical thinking, and understanding of mathematics as a human endeavour" (*Mathematics 6*, 2009, p. 1).

Table 4. 6 Summary of the ESD elements as found in the Mathematics 6 (2009) Curriculum

ESD Elements	Introduction	Broad Areas of Learning	Cross-curricular Competencies	Aim and Goals	An Effective Mathematics Education Program	Outcomes and Indicators
Citizenship and Stewardship	0	1	2	1	3	0
Future Looking Outlook	0	2	1	3	3	3
Actions for Sustainability	0	2	3	0	3	0
Equity, Human Rights and Social Justice	0	1	1	0	0	0
Interdependence	0	0	0	0	0	0
Needs and Rights of Future Generations	0	0	0	0	0	0
Key	Strong 3		Intermediate 2		Weak 1	Not Visible 0

1)   Citizenship and Stewardship

The element of Citizenship and Stewardship that is associated with ESD is not explicitly visible in the *Mathematics 6* (2009) curriculum as shown in Table 8 above. Further analysis of the BAL shows that this element of Citizenship and Stewardship does have weak visibility. This is evident as seen in the excerpt below:

Mathematics provides many opportunities for students to enter into communities beyond the classroom by engaging with people in the neighbourhood or around the world. By working towards developing a deeper understanding of mathematics and its role in the world, students develop their personal and social identity and learn healthy and positive ways of interacting and working together with others (*Mathematics 6*, 2009, p. 4).

Students, through mathematics, are able to conceive the world through lens that allow them to attend to the global issues of climate change, resource exploitations, human conflict, and their interconnectedness. Mathematics can, therefore, provide concrete evidence of the linkage between human activities and the changes that we are currently experiencing in our communities, and by extension the wider world.

Examination of the Cross-curricular Competencies shows that this element of ESD has a rather weak presence as seen from Table 8. Its presence seen does focus on students utilizing "mathematics as a way of knowing the world that all humans are capable of with respect to their personal experiences and needs" (*Mathematics 6*, 2009, p. 9). Thus, students are able to use mathematics to learn from and care for their community in order to promote and foster a high quality of life now and for the future.

From the Effective Mathematics Program, it shows that the element of Citizenship and Stewardship is supported by this curriculum in that students are able to use mathematics as a form of communication. Students can use mathematics to "clarify, reinforce and adjust ideas, attitudes, and beliefs about mathematics" (*Mathematics 6*, 2009, p.12) to make connections and to comprehend real-world phenomena. These connections become relevant in students understanding the power of mathematics in solving the sustainable issues of planet earth. It was also found that mathematics with technology does foster the presence of Citizenship and Stewardship. Students, it

is observed, are brought to focus on the importance of technology towards sustainable development, but there should not be absolute reliance on technology to solve planet's earth environmental challenges. Mathematics allows students to use their intuition to help in the care and protection of the environment. There is no visibility of the element of Citizenship and Stewardship in the Outcomes and Indicators of the curriculum.

2) Forward-Looking Outlook

This element is not visible from the Introduction but does have a moderate presence in the BALs. It is found that this element from analysis of the BALs that it allows students to "experience mathematics in a variety of contexts – both real-world applications and mathematical contexts – in which students are asked to consider questions such as "What would happen if …", "Could we find …", and "What does this tell us?" (*Mathematics 6*, 2009, p. 5). Assessment of the Cross-curricular Competencies reveals that mathematics can be utilized as a tool to advance critical thinking, in relation to their actions and choices and the resulting consequences (*Mathematics 6*, 2009). This is reflective of the element Forward-Looking Outlook which seeks to bring students into an intimate discourse through mathematics to consider the dynamics between human choices and environmental degradation.

As illustrated in Table 8, the element of Future Looking Outlook is strongly emphasized both in the Effective Mathematics Program and the Outcomes and Indicators. From the Effective Mathematics Program, it noticeable that this element enables "students [to] develop and be able to apply mathematical reasoning processes, skills, and strategies to new situations and problems (*Mathematics 6*, 2009, p. 7).

3) Actions for Sustainability

Analysis of the *Mathematics 6* (2009) Curriculum with the ESD element of Actions for Sustainability revealed that this element seeks to develop students having a disposition towards critical thinking and lifelong learning. It was quite noticeable that the element of Actions for Sustainability was not detected from the Introduction, Aim, and Goals nor from the Outcomes and indicators.

Close examination of the BAL section of the curriculum shows that it does have a moderate showing of the ESD element of Actions for Sustainability. Here, it is seen how students will "be learning the skills (including reasoning strategies) and developing the attitudes that will enable the successful use of mathematics in daily life" (*Mathematics 6*, 2009, p. 3). Developing sustainable attitudes are crucial for meaningful, coordinated actions to evolve towards creating a sustainable livelihood. Moreover, students will be so motivated to transfer these skills learned to their choice of career. That is, to choose careers that are in tandem with promoting the care and protection of the earth and its resources while effectively embracing economic development.

From the Cross-curricula Competencies section of the curriculum, it was found that this element of Actions for Sustainability does manifest itself strongly. Students are, therefore "challenged to think critically and creatively" (*Mathematics 6*, 2009, p. 5). Hence, they are able to apply the principles of mathematics to comprehend connections and relationships, especially as it relates to balances and imbalances and their impacts on humans' survival. Analysis of the Aims and Goals of the *Mathematics 6* (2009) curriculum reveal that the goals outlined from face value account do not correlate with the ESD element of Actions for Sustainability.

Examination of the Effective Mathematics Program as seen in Table 8, reveals that the element of Actions for Sustainability does show a strong significant presence. There are seven mathematical

processes that when analyzed, do provide a conduit for students to develop real actions for sustainable development. These processes include communications, connections, mental mathematics and estimation, problem-solving, reasoning, visualization and technology. Problem-solving and reasoning are the two processes where action for sustainability expresses a more dominant feature, in comparison to the other five. From these two processes, students learn how to "develop their own problem-solving strategies" (*Mathematics 6*, 2009, p. 13) through a process of deductive and inductive reasoning (*Mathematics 6*, 2009). Such rationalization will position students to construct solutions applicable to the real-world situation that they will face.

An examination of the Outcomes and Indicators did not reveal much in clear terms how they facilitate the operations of the element of Actions for Sustainability.

4) Equity, Human Rights and Social Justice

This element of ESD is weak overall throughout the entire *Mathematics 6* (2009) curriculum. This element was only seen as shown from Table 8 in the BAL and Cross-curricular Competencies section of the curriculum. From the BAL section of the curriculum, the element of Equity, Human Rights and Social Justice is seen where mathematics provides the conduit whereby students learn how to become engaged citizens. This is done through the analysis of topics such as "trends in climate change, homelessness, health issues (hearing loss, carpal tunnel syndrome, diabetes), and discrimination can be used to engage the students in interacting and contributing positively to their classroom, school, community, and world" (*Mathematics 6*, 2009, p. 4). These analyses evoke a better understanding of students about their responsibilities in daily decision making that not only impacts their communities, but the world now, and in the future.

Observation of the Cross-curricular Competencies reveal that Mathematics which promotes critical thinking, take students along a trajectory where they become contemplative of questions

such as "What would happen if …", "Could we find …", and "What does this tell us?" (*Mathematics 6*, 2009, p. 5). These questions help to morph attitudes and values that are altruistic, which are akin to the element of Equity, Human Rights and Social Justice.

5) **Interdependence**

This element of ESD was not visible in any of the sections of the curriculum that were analyzed.

6) **Needs and Rights of Future Generations**

As shown in Table 8 the element of Interdependence is only visible in the Cross-curricular Competencies section of the curriculum. From this section of the curriculum, it is seen where students learn how to become cognizant of their responsibility to "accept responsibility for the consequences of their choices, decisions, and actions" (*Mathematics 6*, 2006, p. 5). Mathematics presents a visual, practical means by which this knowledge can be disseminated to students thereby providing connectivity between human actions and inactions concerning sustainable development.

7) **Inquiry in the Curriculum**

Analysis of the *Mathematics 6* (2009) curriculum shows that it is embedded in inquiry. This is noticeable from the BAL which outlines this pedagogy as being active. Hence, the teacher's role does evolve from being the producer of knowledge to a facilitator, and students are therefore granted the opportunity to "discover the mathematics outlined in the curriculum rather than the teacher covering it" (*Mathematics 6*, 2009, p. 3). It is seen from this section of the curriculum where learning is presented as being dynamic, moving from the four walls of the classroom into their communities to better understand the interplay between real-world problems and mathematics. The inquiry approach it is seen allows for students to "become better informed and have a greater

respect for and understanding of differing opinions and possible options" (*Mathematics 6*, 2009, p. 4). All this is engendered through a student-led inquiry approach.

From examination of the Cross-curricular Competencies, it was found that the inquiry-based approach challenged students to proceed from curiosity to enter a realm to "think critically and creatively" (*Mathematics 6*, 2009, p. 5). Hence, students learn to solve problems by employing ingenuity and collaboration which motivates and builds confidence. The Aims and Goals of the *Mathematics 6* (2009) Curriculum shows that the four goals are directly embedded imbued by the inquiry-based approach. Students are therefore actively involved in constructing their mathematical knowledge through exploration, modeling, constructing, deconstructing, and observing (*Mathematics 6*, 2009). Students, therefore, learn to "challenge the boundaries of their experiences and to view mathematics as a set of tools and ways of thinking that every society develops to meet their particular needs" (*Mathematics 6*, 2009, p. 10).

Similarly, to the other curricula, inquiry in the *Mathematics 6* (2009) curriculum is guided by inquiry questions. Such questions provide the framework which aids in the development of critical thinking and reflection, thereby producing the attitude and values that ESD seeks to develop in students. Analysis of the Outcomes and Indicators show that it will be the responsibility of the teacher to convert all that the students need to learn and demonstrate into active, student-led inquiry learning. The teacher does play an important role in the use of inquiry in the classroom, and therefore must be cognizant of the design of inquiry-based learning to effective and successful transfer this in the classroom.

Analysis of the teacher interviews and the document analysis coincide on the potency of inquiry-based learning as the best pedagogical approach to drive education for sustainable development in the classroom at the elementary level. This study does also underscore the efforts by some teachers who are willing to integrate ESD into the curriculum through the use of IBL.

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Table 4. 7 Word Frequency of the word "Inquiry" from the four curricula analyzed in NVivo

Subjects	Word Frequency	Weighted Percentage %
English Language Arts	55	0.39
Mathematics	39	0.35
Science	41	0.68
Social Studies	41	0.68

Table 9 above does show the frequency by which inquiry is mentioned in each curriculum. This adds significance that the curriculum heavily emphasizes IBL as a choice pedagogical approach for learning and student involvement.

The findings from this research do add significance to the argument posited by Gough and Sharpley (2005) and Summers and Kruger, (2003) who are suggestive of utilizing teaching strategies that are student-driven, which allows for investigation and critical thinking when teaching ESD. These strategies bare semblance to IBL and are descriptive of how this pedagogy is articulated in the curriculum analyzed to achieve the set outcomes and indicators.

4.3 Summary

The document analysis gives an overview of how the six elements of ESD are reflected in the four curricula of English Language Arts, Mathematics, Science and Social Studies. The six elements used to analyze each curriculum are Citizenship and Stewardship, Future Looking Outlook, Actions for Sustainability, Equity, Human Rights and Social Justice, Interdependence and Rights of Future Generations.

Of the four curricula analyzed, it is quite evident that the six elements of ESD are more dominant in the Social Studies curriculum followed by the Science curriculum. The mathematics curriculum is the least demonstrative of the six elements of ESD. The quality of ESD education at the elementary level is correlational with the emphasis and quality that the curriculum dedicates to the focus of students learning about sustainability. As reflected from the curricula analyzed, not all the curriculum gives much diligence to all the elements of ESD. The elements that were emphasized were Citizenship and Stewardship, Forward-Looking Outlook and Actions for Sustainability.

Because not all the elements of ESD are transparent in all the curricula analyzed, it will, be incumbent on teachers to create these real-world learning situations where student can make connections, so they can formulate solutions that are reflective of the element of Actions for Sustainability. A worrying factor that prevails is that some teachers are unable to make the explicit connection from what the implicit idea conveyed by the contents of the curricula.

All the curricula analyzed do place much emphasis on the use of inquiry-based learning as the preferred student-led pedagogy that will allow students to make those real-world connections. This form of methodology is embraced by all the curricula because of its philosophical stance which provides guidance and the opportunities for students to be integrally involved in the learning process. Hence, students can conduct their own investigations to solve problems and to make those transdisciplinary connections. Students through IBL are able to evoke deep holistic learning, connectivity, and changes in beliefs, values, and attitudes, thereby providing the catalysis to activate these changes from the content of ESD.

CHAPTER FIVE: RESULTS, RECOMMENDATIONS AND CONCLUSIONS

5. Introduction

This research sought to determine whether the Saskatchewan mandated curricula of English Language Arts, Mathematics, Science and Social Studies do support Education for Sustainable Development (ESD) through the inquiry approach. It also attempted to determine the challenges and barriers that teachers encounter as they try to integrate the two in their classroom. The ethos of ESD is to equip students with the necessary knowledge and understanding concerning the interlinkage and interdependency of the ecological, social and economic aspects of sustainability and sustainable development. ESD further encompasses transforming students' values and attitudes, as well as equipping them with the capabilities and skills conducive to achieve a sustainable future, which will propel them to become active participants in this change.

5.1 Significance and Contributions

The current environmental challenges have posited education as the best response to evoke action towards sustaining a better quality of life now and for future generations. Young children learning about sustainability will develop attitudes and values that will reflect the sustainability ethos (Taylor et al., 2015). Education for Sustainable Development is embedded in fostering connectivity which requires students to be actively involved in the learning process that will result in this attitudinal and behavior change that will transform lives. Hence, this research arose from a personal need to determine whether IBL as a student-centered pedagogy can be used to effectively channel ESD for students at the elementary level. Due to the paucity of qualitative research on the relationship between inquiry and ESD, my objectives were to determine whether there exists a strong correlation between the two variables. Additionally, there was a need to ascertain the

challenges that teachers experience in integrating ESD through inquiry in the curriculum used in Saskatchewan classrooms.

Arising from the research conducted, the results garnered have added significance to previous studies conducted about the importance of ESD to education. One such significant contribution of this study to previous studies is that ESD taught in schools can furbish students with specific skills and values that will empower and foster change (Armstrong, 2011). The curricula analyzed do recognize this and do try to inculcate some of these values and skills as seen in Figure 6 below.

Figure 5. 1 Tree Map-Parent and Child Nodes of the Elements Affiliated with Sustainability and ESD as coded from the four Curriculums
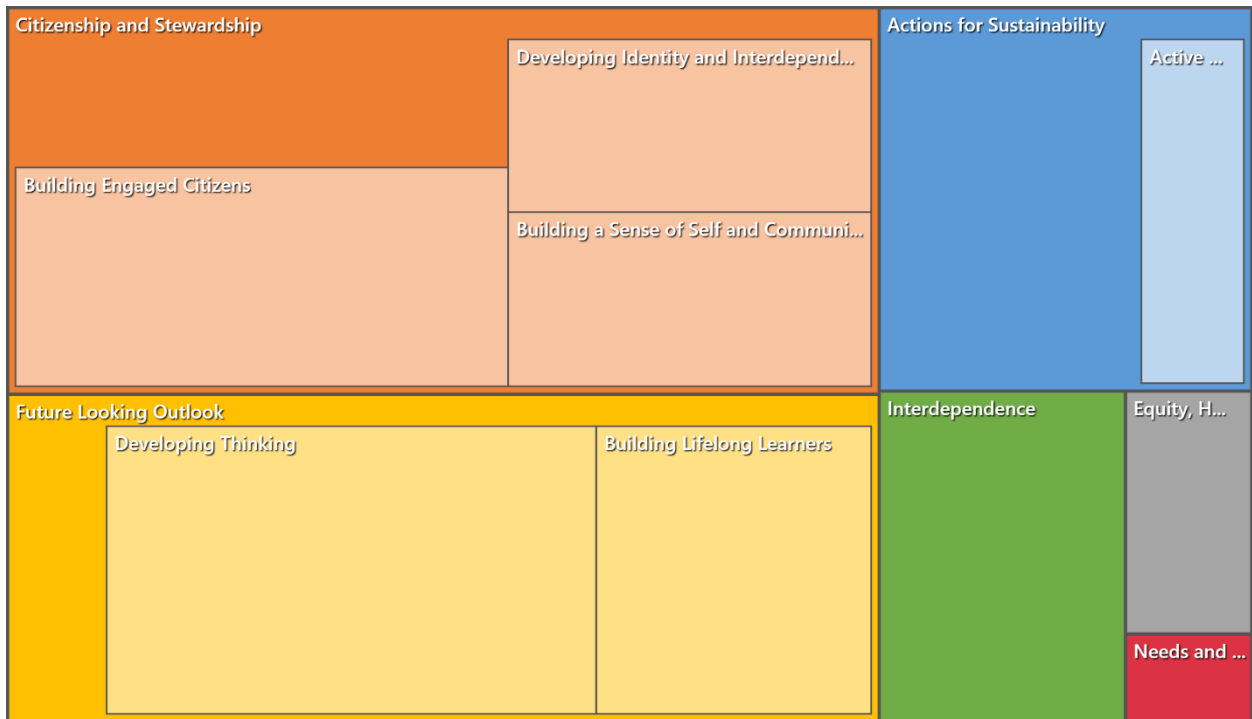

Figure 6 above shows that Citizenship and Stewardship, and Future Looking Outlook, as elements of ESD were predominantly featured throughout the four curriculums analyzed. As it relates to Citizenship and Stewardship, the curricula placed much emphasis on developing students

who will become engaged citizens. This correlates strongly with the views of Gough and Sharpley (2005) who concur that Citizenship and Stewardship enhance and stimulates environmental consciousness among students. Citizenship and Stewardship as elements of ESD ultimately serve as catalysis for morphing students who will assume active roles to solve the environmental problems in their communities and by extension on the national and global level. Such consciousness will begin the process of identity metamorphosis and students are learning that they are a part of a larger global community. Additionally, they will realize that their actions do have enormous implications in determining the quality of life for now and for the future.

The element of Future looking Outlook focused extensively on nurturing students who are critical thinkers. This is a cardinal ingredient for social change towards achieving a sustainable future and for improving the quality of life now. This affirms the argument made by Barnett (1997) and Tilbury (1995) that posits that developing critical thinkers is a proportionate response to the environmental and developmental issues humans face. The constituents of the curricula do acknowledge this skill. Students who become critical thinkers will continuously possess an insatiable appetite for knowledge, will question norms, and seek to pursue a path for solutions for those probing environmental challenges that persist. Hence, lifelong learning serves as a powerful vehicle that will drive the transformation of students' attitudes and values. These are essential factors to convert environmental problems and concerns into active sustainable responses. These two elements, therefore, set the foundation for the evolving of the other four elements of ESD to emerge.

The curricula emphasize Actions for Sustainability as another critical ESD skill that students need to develop in order to become agents of change towards a sustainable future. The findings from the curricula correlates with Taylor et al. (2015) who highlighted that students developing sustainable knowledge and attitude can become advocates that elicit actions towards

sustainability. The teachers' responses from the interviews conducted also elevated Actions for Sustainability as an important skill that students will master from learning ESD at this age. This strengthens the veracity of research studies (Laurie et al., 2015) that posit that student engaged with ESD will act responsibly to take action whether individually or collectivly. Additionally, they will be more adamant to hold political leaders and other sectors of the society accountable for their actions towards the environment. Children as agents of change, who discover their potential and influence, can instigate change on a grand scale.

Another significant contribution of my research to previous studies done in the area of ESD is to affirm that there exists hesitancy among teachers to integrate ESD into their lessons. As identified from the Figure (6), the curricula do emphasize the different elements of ESD, though not all the elements are evenly distributed in all the curriculum nor are all of the six elements clearly or explicitly visible in the curriculum. Analysis of the teachers' interviews explains that the lack of clarity in how ESD is embedded in the curriculum does significantly contribute to teacher apprehension and unwillingness to incorporate this beyond a surface treatment in subject areas or to adopt a more transdisciplinary approach to ESD in the classroom. These findings endorse what Chatzifotiou (2006) discovered from his research that ESD lacks prescriptive guidelines and guidance when introduced into curricula. Hence, and as affirmed by the teacher responses, ESD integration into the curriculum and practice is done in an ad hoc manner. Subsequently, each teacher executes their own vision and understanding of how they believe ESD should be integrated into the curriculum. The findings from my research help to articulate what Taylor et al. (2015) discovered from their students that most teachers are reluctant to incorporate ESD in their lesson because of the lack of 'know how".

The Saskatchewan curriculum for elementary schools must be applauded for its efforts to integrate ESD into the classroom. However, analysis of the four curricula and the teacher

interviews indicate that there is considerable variation between the expected outcomes as outlined by the curricula and what knowledge the classroom teachers possess to execute such outcomes. Another significant finding of this research in relation to the broader area of literature to ESD is that teachers lack a deep understanding concerning ESD. The knowledge structure of classroom teachers, therefore, need to be enhanced so they can become experienced in assisting students in linking together the three pillars of sustainable development. This was also categorically stated by Taylor et al. (2015) and Summers et al. (2005) that teachers' conceptualization of ESD which is mostly limited to environmental literacy. ESD discourse constitutes much more than the recycling of garbage; rather it is, fundamentally, about change in attitude and values that affect actions to create a sustainable livelihood.

Education for Sustainable Development is an action-oriented response to the unprecedented global environmental challenge that we face. ESD not only fosters critical-thinking among students but is supportive of the values and attitudes to create mindful shifts in pursuit of a sustainable future. Through ESD students learn about authentic engagement through the sustainable lens, rather than being mere repositories absorbing information from their teachers. Subsequently, ESD brings significant changes to how teachers approach teaching in the classroom. Education for Sustainable Development embraces a pedagogical approach that is investigative and allows students to be intricately involved in the learning process.

Education for Sustainable Development, as stipulated in numerous research studies, , does contributes considerably to quality education. As mentioned by UNICEF (2000) quality education includes "outcomes that encompass knowledge, skills, and attitudes, and are linked to national goals for education and positive participation in society" (p. 4). Classroom teachers are significant to the integration of ESD in their schools. However, this research while demonstrating benefits of

ESD to education and students, shows there are significant discrepancies between its imbued values and the emphasis that is placed on ESD in teacher education programs.

Anyolo (2015) in reference to Hungerford (2010) stated that "teachers have a responsibility to help learners develop and address the knowledge and skills needed, to enable them to understand complex sustainable development issues, and the sustainability challenges facing society" (p. 53). Hence, this research supports Anyolo's (2015) claims about the importance of teacher education in the development and improvement of teacher capacity integrate ESD in practice. Teacher education is crucial to assist teachers in integrating ESD themes in their lessons and such training will significantly improve the synergy between the multidisciplinary nature of ESD, and the knowledge, values, and attitudes that students need to develop to challenge status quo suppositions. Thus, it can be argued that there must be a serious investigation into why teacher education programs do not include studies in how to incorporate ESD in curricula and practice.

Findings from this research also run parallel to that which is articulated by Anyolo (2015) who posited that time is a major inhibitor for the proper integration of ESD into the curriculum. The analysis of the teacher interviews underscores time constraints as a deterrent for ESD to be materialized in the classroom. This was corroborated from observation of the outcomes that must be achieved from the Unit Topic, and the associated activities that ensue in their achievement. The curricula analyzed appear to be content heavy to many teachers and this means that they overlook the benefits which can be attained from students being engaged through a student-centered pedagogy of inquiry.

Analysis of the outcomes in relation to the activities that are designated for the achievement of these outcomes – that is, the indicators - justifies my argument that the curricula are dense. The achievement of such activities requires time, which allows for the traditional teacher-centered form of teaching to seem a more convenient way to honor the attainment targets set by the ministry.

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Thus, it can be concluded that though the Saskatchewan Elementary Curriculum may boast of a program of study that facilitates education for sustainable development, some school administrators are still subjecting the curriculum to the traditional format and goals of learning. As indicated in the conversations, some teacher participants highlighted that administrative support, or lack thereof, does influence implementation of time-honored ESD experiences to achieve the goals of sustainable living. This dramatically affects what teachers believe they can do to facilitate ESD while ensuring the achievement of set educational outcomes or to cover specific subject area knowledge.

Inquiry learning is a progressive student-led approach that equips students with skills for lifelong learning. Through inquiry learning, students are initiated into a process of questioning, investigation, analysis, rethinking and evaluating through individual and collaborative efforts. It is observed from the document analysis and corroborated in Table 9 above, inquiry-based learning is embedded in the written curricula as an interdisciplinary approach to provide creative activities both within the classroom and in communities to cultivate problem-solving skills. Problem-solving activities have the added advantage of transforming students to become critical thinkers who are able to solve the challenges associated with sustainability competently. It is teacher interviewees did indicate that concerns about time is be a limiting factor which cans restrict inquiry learning in classrooms. The inquiry approach requires flexibility to ensure that enough time allotted for its true potency with ESD to be achieved among students.

5.2 Summary

This research is significant in several ways as it adds validity to a number of similar studies concerning ESD and its implementation in education. Firstly, it affirms the fact that ESD integrated into the curriculum does help in the development of specific critical skills, values, and attitudes

that are essential for the operationalization of the vision and goals of ESD. This was affirmed by teacher participant – for example, when Kerry stated that teaching ESD at the elementary level does help students to re-evaluate their values and brings about a heart to heart connection with sustainability. Given the analysis of the Saskatchewan curricula, it is also clear that elementary students in the province are to develop understandings about the care and protection of the earth's natural resources. The hope is that they will mature into critical beings, mastering the art of problem-solving through collaborative efforts. Students are also to become mindful about exercising responsible actions in matters of ethics and social justice while being reflective of and cognizant of the impact their actions toward creating and sustaining a healthy lifestyle that will be conducive for future generations.

In addition, this research supports studies that reveal teachers' hesitancy to integrate ESD in their classrooms. This stems from a number of co-related issues such as lack of awareness surrounding the concept of ESD and SD. Time constraints, lack of clarity and guidance and lack of appropriate teacher education are other hovering issues that hinder teachers' receptivity to integrating ESD in their practice.

Importantly, all the teacher participants in the research did endorse IBL as a robust pedagogical method for ESD in the classroom. The teachers' views do contribute to other research studiess that argue that the implementation of ESD into the curriculum is best facilitated through a pedagogical approach that is student-driven, investigatory, reflective and action-oriented. These are achievable through IBL used in the classroom.

5.3 Implications for Future Research

The success of the sustainability agenda through Education for Sustainable Development at the elementary level is commensurate to a strong sustainability network. Sustainability network provides support for classroom teachers in aiding students to make those possible connections to sustainability experiences. Teacher interviewees have underscored the importance of connecting with these more experienced persons who do make a significant contribution to ESD in the classroom. Such sustainability networks help in the development and maintenance of the sustainability synergy of the content to be taught, and what must be learned to cultivate students as the agents of change towards a sustainable livelihood. It was surmised that the onus has been on the teacher to develop this sustainability network. There must now be greater consideration concerning the usefulness and benefit of these sustainability networks for teachers in the classroom.

Consequently, there is a need for more in-depth research to be undertaken to understand how such networking can better promulgate and coordinate the education for sustainable development for students at the elementary age level. Sustainability networking can serve as an external reinforcement method in providing a more experiential and real-world connection for students and teachers. Sustainability networks will aid in the establishment of sustainability communities, thereby providing a bolster for teachers who may be experiencing feelings of isolation in their efforts to impart ESD to their students.

The teachers interviewed are cognizant of the need for students at the elementary level to be engaged through education for sustainable development. All the teachers interviewed have expressed their devotion to the call for teaching sustainability in school but, have lamented the deficiency in internal support. Internal support includes both administrative and peer support. While the need for external sustainability network can be endorsed as a strong support cast in the

sustainability endeavor, peer support will play a central role in intensifying efforts in forming a whole systems approach towards integrating ESD at the elementary level. Peer support, from my perspective, will increase enthusiasm amongst teachers, which can be a form of catalysis to promote change and reform, as the curriculum seeks to formalize the Decade for Education for Sustainability agenda through education. With all-hands-on-deck, teachers will become more innovative in generating ideas that can be used in and outside of the classroom to work compatibly with the added dimension of inquiry-based learning.

Based on the interviews conducted it was evident that some teachers are committed to ESD which emanates from their personal beliefs and values. Beliefs and values are core factors that determine and sustain action. It was pointed out from the interviews conducted that teachers' reception to the teaching of ESD is hinged on their belief and value system. Thus, a question that arises from this research is whether teacher's belief plays a significant role in ESD taught in the classroom. Such research will provide future insights on other hindrances concerning the implementation of ESD in the classroom by teachers.

This research has shown that not all the elements ESD were explicit in the written curriculum, which in my estimation does serve as a contributing factor for its lack of implementation of integration into their lessons. Therefore, I think it is feasible for research to be conducted with the intent to determine how to make ESD with its interdisciplinary nature more explicit.

5.4 Recommendations

The research conducted was to ascertain whether inquiry was indeed the best method of integrating education for sustainable development through inquiry in the classroom. Based on the results garnered from the interviews conducted and analyzed, paired with the document analysis

performed on the four curricula, the following recommendations are deemed timely. Arising from the challenges that teachers experience in the classroom, such as lack of administrative support and even curriculum support, I highly recommend that inclusion of sustainability in the curriculum take on a whole school approach.

A whole school approach calls for schools to become adaptive towards sustainability in a holistic manner. Ferreira, Ryan and Tilbury (2007) stated that the "whole-school approaches recognize that sustainability is relevant to all aspects of school life including formal and hidden curricula, school leadership and management as well as teacher development. Whole school approaches encourage schools to practice what they preach." (p.8) Hence, all facet of the school should be reflective of the ethos which embodies sustainability. This includes the governance, facilities and operation, partnerships, curriculum and pedagogy, and the wider community. This holistic vision must be articulated in the school's curriculum, administration, teaching and learning, stakeholders, in the school's operation, physical surrounding and with its relationship with the local community. The whole school approach can foster a co-engaged learning environment through mainstream involvement. This whole school approach will, therefore, extend and heighten mainstream participation, providing a more unified approach to environmental challenges faced, and resolved through education for sustainable development.

In this whole school approach to the implementation of education for sustainable development, I am recommending that school administrators consider adopting a peer mentorship approach for teachers in the classroom. The peer mentorship approach consists of pairing a more seasoned teacher experienced with sustainability with a younger, less inexperienced teacher. This approach I believe will provide teachers with the support that they need to integrate ESD through

inquiry in their classroom. These more experienced teachers will be able to furnish other teachers with invaluable, innovative means of making the curriculum more organized and meaningful. This form of support will build teacher networks in the school, providing supplemental motivation for teachers as well as a collaborative space for those teachers who are seeking that additional help to augment their confidence with ESD in the classroom. It is also recommended that each school takes on the responsibility of building a school-wide sustainability network. Each teacher can contribute to this network by securing the permission of their sustainability contact persons to be resources persons for the school on the whole.

As an extension of the environment support network that can be established to support teachers, I also recommend that this network not just be confined to mere physical presence but should be technologically driven. Such a network would take the format of a website where teachers can communicate, access information, utilize information, collaborate and interact with each other as it relates to integrating ESD into their lessons. Teachers from this website will also be able to find appropriate ESD resources for their lessons by using, for example, videos, music, or just where to find out information about options that are available for educational, environmental outdoor learning trips. From this website a discussion forum can be established which will allow for discussions as teachers will be able to post lesson plans, view other lesson plans posted as well as have discussions among themselves. There can also be a portal for messaging and conferencing which will enable text messaging and video conferencing to further supports meetings, collaboration, communication, and training. Such a website would provide support even for those teachers in rural areas who require assistance in integrating ESD through inquiry in their lessons. I do propose that this website can be established either by the Saskatchewan Ministry of Education or this can be done by the school division. I believe this would be an excellent means by which

teachers can provide innovative ideas to other teachers who are struggling with the issue of making ESD through inquiry a more meaningful experience for their students.

I also recommend that the Saskatchewan Ministry of Education consider rewriting the present curriculum in order to make the elements and presence of ESD more visible for teachers. I suggest that the following format could be considered to make this more explicit in the curriculum. The Outcomes and Indicators as seen from the different curriculum could be accompanied by recommended procedural activities. The procedural activities guide teachers, in that they outline the actual experiences in which teachers can engage students to achieve the learning outcomes. This would provide teachers with better clarity about what can be done to achieve the stated outcomes, as well as naming resources that can be utilized and the assessment procedures that can be employed. Additionally, the curriculum could provide examples of possible places that teachers may explore with their students to enhance ESD integration in the curriculum. This by no means limits the teacher to be innovative in their classroom but provide some guidance to a very open curriculum that presently exists.

Education for Sustainable Development seeks to empower students with the capacities to make sustainable changes to engender a sustainable future. Therefore, ESD is a form of transformative, student-centered pedagogy that is designed to furnish students with knowledge, skills, and mindset to posit these changes. Inquiry as the chosen pedagogical approach enhances these capacities in students, especially at the elementary level. It is highly recommended that Professional Development (PD) days be organized for teachers. These PD sessions should focus more on training teachers how to integrate both ESD and IBL in the classroom. These PD days should be more adoptive of a more practical approach where teachers can be given the hands-on experience that they can transfer what was learned into their classroom, thereby increasing their capacity and confidence of integrating and teaching this in their classroom.

If education is to be at the helm of engendering a transformative kind of lifestyle and encourage actions towards attaining a sustainable future, then teachers who will lead this charge must be fully equipped cognitively and pedagogically to integrate this in their classroom. Teachers gaining such competencies is achievable if teaching education institutions commit to including the sustainability challenge as part of their mandate. Teachers receiving this formal education will assist in de-simplifying the complex issue of sustainable development to be taught to students. Many teachers it has been found and substantiated from the interviews, refrain from teaching ESD in their lessons because they are ill-equipped to execute because of limited knowledge and pedagogical training.

Despite their essential role, teacher educators are often overlooked. The role of the teacher educator is difficult and complicated and of great importance. In both developing and developed contexts, improvement in student learning outcomes could be attained if teacher educators were better prepared, resourced and supported (Deem & Lucas, 2007). Despite this reality, only in "few countries are there useful frameworks for the professional development, support and guidance of the teacher educator. Rather than planned programs of work, many teacher educators approach their work in an ad hoc way" (INEE, 2015: 104-5).

Making education for sustainable development an integrated part of teacher education institutions will significantly assist teachers with the ability to link education and the interrelated pillars of the social, economic and ecological dimensions of sustainable development. This will assist to illuminate teachers' vision and awareness in making strides towards achieving the 2020 goals for sustainability. Thus, teachers will become stimulated and motivated.

As illustrated in the literature, the content of education for sustainable development (ESD) does endorse the constructivist epistemological approach to teaching and learning in the classroom. Findings from both the interviews and analysis of the curricula conducted illustrate the potency of

inquiry-based learning to increase the productivity of ESD in the classroom. Therefore, it becomes crucial for teachers to receive adequate training in the inquiry approach to ESD in the classroom. This must become a part of the teacher education agenda to make inquiry a core part of the pedagogical focus when training teachers for integrating and making ESD transdisciplinary element of the curriculum.

5.6 Conclusion

The environmental challenges of the current decade do require education to be used as a conduit to effect attitudinal and behavioral changes in all areas of society. In order to provide a proportionate response to the weight of the challenge faced, it is essential to re-engage the thinking of young minds that will be adoptive of responsible daily choices to guarantee a sustainable future. Thus, education for sustainable development can advance this shift towards critical reflection and empowerment of young children in our nation required to start the change toward improving the quality of life and effecting societal transformation. The global discourse contends that if our students are to become empowered, they must become good stewards and of the land who are cognizant of the interconnected relationship between the environment, society, and our economic principles. Students must be empathetic to the needs of others to obtain an environment that is healthy and productive. Such outlooks only become possible when students experience a change in their values and attitudes that condition sustainable development. Such change provokes and evokes actions both individually and cooperatively.

The nature of education for sustainable development presents a holistic approach through education which is transformative and hence requires an action-oriented, student-centered pedagogy. The research, therefore, was directed toward determining whether education for sustainable development at the elementary level would be successful in cultivating students as agents of change

towards sustainability through the use of inquiry-based learning. The interviews conducted illustrated a robust positive relationship between ESD and inquiry-based learning in the classroom with elementary students. Therefore, it can be concluded that the hands-on experiences that the inquiry approach offers to students will allow them to make those connections that are intrinsic to ESD and that which are needed for attitudinal and behavioral changes towards attaining a sustainable lifestyle. Education for Sustainable Development builds within students specific competencies that are salient for contributing to dialogue and solutions for sustainable development. Through ESD students attain the competencies of being lifelong learners, critical thinkers, problem solvers, and the ability to adapt to change. Students also learn how to deal with conflict, as well as how to engage community members and the wider society to posit change. These skills were evident from the literature reviewed, the interviews and curricula analyzed which all justified the use of inquiry-based learning as an effective methodological approach to integrating ESD across subjects in the classroom.

The findings elucidate that though there is a strong positive relationship between education and sustainable development and inquiry-based learning in the classroom, there exist some barriers or challenges that affect this relationship in the classroom. Some of these challenges include the lack of administrative support, lack of sustainability training, time constraints, lack of sustainability networking and peer support. It, therefore, can be concluded that if teacher education institutions make the sustainability training an integral part of the teacher education program then education as a tool to for sustainable development will become a more effective medium.

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APPENDIX A

Consent Form for Invitation to be Interviewed

Date:

Dear **(Insert Participant's Name):**

This letter is an invitation to consider participating in a study I am conducting as part of my master's degree in the Department of Educational Foundations at the University of Saskatchewan under the supervision or Dr. Lynn Lemisko. I would like to provide you with more information about this project and what your involvement would entails if you decide to take part.

Mounting concerns about the degradation of the environment, and developmental problems, have marshalled the call for a new thrust for preservation through sustainability. There is a growing sense of consciousness that sustainability is the way forward which is accomplished through education by way of education for sustainable development (ESD). ESD aids students in being proactive thinkers, in that students learn to contemplate current and emergent and future situations. ESD is considered effective in generating students' self-reflection in pondering their learning, which has the effect of stimulating changes in values, attitudes, and behaviors. Inquiry based learning can be used to integrate ESD in the elementary curriculum as it does have the capacity to bring about environmental consciousness, stewardship and enhance sustainability, but also for students to become intricately involved in the teaching/learning process. The purpose of this study is to explore the use of inquiry-based learning as a means of promoting education for sustainable development at the elementary/primary level.

This study will focus on whether the mandated curricula in various educational jurisdictions exists to support Education for Sustainable Development through inquiry-based learning. As well as to investigate the cross-curricular inquiries that grade six teachers in Saskatchewan use to teach sustainable development in EAL, Mathematics, Social Studies, and Science. This study will also investigate the barriers/challenges that grade six teachers perceive in their efforts to implement ESD by way of inquiry approaches.

Involvement in this study is entirely voluntary. Data to be collected will be done by way of an interview of approximately 11 questions in length to take place at a mutually agreed upon location. You may decline to answer any of the interview questions if you so wish. Additionally, you are free to withdraw from this study at any time without any negative consequences of any sort by advising the researcher. There are no known or anticipated risks (e.g. emotion, social, psychological, physical, or economic) to you by participating in this research**.**

With permission granted, the interview will be tape-recorded to facilitate collection of information, and later transcribed for analysis. After the completion of the interview, a copy of the transcript will be sent to you to give you an opportunity to confirm the accuracy of our conversation and to add or clarify any points that you wish. All information provided is considered confidential. Your name will not appear in the thesis report resulting from this study, however, with your permission anonymous quotations may be used. Data collected during this study will be retained for five years in locked office in my supervisor's lab. Only myself and my supervisor will have access to data collected. There are no known or anticipated risks to you as a participant in this study.

If you have any questions regarding this study or would like additional information to assist you in reaching a decision about participation, please contact me at (306)261-6801 or by e-mail at tss386@mail.usask.ca. You can also contact my supervisor, Dr. Lynn Lemisko at (306) 966-7581or e-mail lynn.lemisko@usask.ca.

This research project has been approved on ethical grounds by the University of Saskatchewan Behavioural Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

I hope that the results of my study will be of benefit to those organizations directly involved in the study, other voluntary recreation organizations not directly involved in the study, as well as to the broader research community.

I very much look forward to speaking with you and thank you in advance for your assistance in this project. Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I

consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____   _____

Name of Participant   Signature

Sincerely,

_____   _____

Tamica Small   Dr. Lynn Lemisko

Graduate Student   Associate Professor

Educational Foundations   Educational Foundations

APPENDIX B

Questions for interview:

1) What do you understand from the term, "sustainability"?

2) What do you understand from the term, "sustainable development"?

3) Is it important for sustainability to be taught schools?

4) What do you think education for sustainable development entails?

5) Do you think the present curriculum at the elementary level facilitates the integration of sustainability in the classroom?

6) Do you think that ESD can improve educational outcomes for elementary students?

7) How can ESD guide students to have the knowledge, skills and values to care for and solve the sustainable development issues that will arise in their lifetime?

8) Do you use inquiry approaches in you teaching practice?

9) Do you think that inquiry is the best pedagogy for integrating ESD at the elementary level?

10) What barriers and challenges do you as a teacher encounter as you try to implement ESD and inquiry in your teaching practice?

11) Can you describe a project that you have used to integrated ESD and inquiry in the classroom?

11b) What were the subject areas integrated in the project?