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Effective Environmental Education for All: An ELL Curriculum Designed for the Namib Desert

Environmental Education Trust

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by

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ABSTRACT

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The following paper is based on my internship at NaDEET, a non-governmental organization in southern Namibia that focuses on environmental education. Most of the participants that come to NaDEET to learn about sustainable living and alternative energy sources through overnight visits are school-aged children. Through working and teaching at the environmental education center during weeklong programs, I observed that some of the 5th-7th grade students lacked English skills to fully benefit from the NaDEET program. I conducted informal interviews and a survey to determine if there was a difference between Upper Primary students' and English Language Learners' (ELLs) absorption of class material and sustainability concepts. After determining there was a gap, I researched how to best design a curriculum that meets the needs of ELL groups. For my project, I have created a Lower Primary program that aims to break the language barrier and ensure better participant understanding of the environment and sustainable living.

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Chapter 1: Introduction

This paper is based on the internship I completed at the Namib Desert Environmental Education Trust (NaDEET) located in the Namib Desert in southern Namibia. NaDEET is a non-governmental organization that brings groups, mostly comprised of school-age children, to its environmental education center to learn about sustainable living and alternative energy sources through overnight visits. In July 2009, I went to NaDEET to learn more about the organization and its work, and how a grassroots education-based NGO operates on a day-to-day basis. After teaching and assisting at the environmental education center during weeklong programs, for a wide-range of students with varying academic capabilities, I noticed that the Upper Primary program, intended for 5th-7th grade students and utilized for all students of this age group, was too advanced for some of the school groups who visited the center. In particular, I felt the Upper Primary program was ill-suited for schools that came from rural areas of Namibia where English was not a first language.

Therefore, my project strives to answer this question: How can a curriculum be designed to best teach environmental education to English Language Learner (ELL) participants in sub-Saharan Africa and at NaDEET, keeping in mind that many of these students are also behind their peers academically? Thus, for my project, I hope to answer this question through the development of a Lower Primary program for participants who do not speak English as a first language or are at a lower academic level than their peers in more financially supported and geographically accessible schools. Lack of English language skills, and the physical location of many of the rural schools in Namibia are consequences of colonization and apartheid policies. It is important to understand the severity of these policies and how they have affected, and continue to affect, the education of Namibians. The majority of rural residents directly depend on the

environment, which makes it even more important to provide access to appropriate environmental education.

To answer my research question, it is first necessary to take a deeper look at the history of Namibia to better understand the situation of ELLs and how a program could be designed so that environmental education at NaDEET Center is relevant and accessible to all students regardless of their English language skills. Next, there will be a discussion of the theories and goals of environmental education and different educational models. Finally, a Lower Primary program is outlined that aims to break the language barrier, ensure better participant understanding of the environment and sustainable living, and allow for simple teacher translation to provide equal access to environmental education at NaDEET.

Chapter 2: Namibian History

The first-known explorers to the present-day country of Namibia were Portuguese and arrived in 1485 and 1486. However, it was not until the 18th century that the next Europeans arrived and began to exert their influence in the country. These European explorers brought with them guns, along with manufactured goods, exacerbating group conflicts in the country, which were not always based on ethnic lines, but on socio-economic and likely resource issues (Katjavivi 1988: 5). Although the colonization of Namibia brought a dramatic hyper-segregation of ethnicities, the country had largely been settled in similar fashion before the European colonizers arrived with the different ethnic groups surviving in their own niches of the dry, vast country. The Ovambo were mainly in the North, the Nama in the South and Herero and Damara were located in the central and north-western parts of the country, with other ethnic groups claiming their territory on the edge of the Kalahari or in the most inaccessible and inhospitable areas (Katjavivi 1988: 1). Prior to contact with Europeans, Namibia had been known as the Trans-Gariep, which came from the Nama language and means ‘across the Orange River’ (Katjavivi 1988: 6).

After the Germans defeated the French in the Franco-Prussian War, Germany emerged as the supreme European military power and thus decided it needed an overseas colonial empire to showcase its power (Harring 2002: 3). However, it was a latecomer in colonization and in the ‘scramble for Africa’ had missed out on the most productive land in the desirable, resource rich areas (Hearn 1999: 36). Adolf Lüderitz, insistent on setting up a colony in southwestern Africa, bought some coastal land at Angra Pequena, a site founded by the first Portuguese explorers in the late 1400s, from a Nama-Oorlam chief named Josef Fredericks in 1883, re-named it Lüderitz, and proposed making the land a new colony of his native Germany (Weigend 1985: 167; Masson

1995: 248). The German public, much in favor of a colonial empire were undoubtedly even more convinced of Namibia's colonial worth when diamonds were discovered near the town (Hearn 1999: 36). It was at this point, in 1884, that Germany declared the western coast between the Kunene and Orange Rivers a German protectorate and Namibia began its 100-year long struggle for independence. It was also at this point that the Trans-Gariep was re-named South West Africa or German South West Africa. Lüderitz became increasingly important as the port that allowed for German dominance and economic and political interests to take hold when indigenous peoples resisted German rule (Katjavivi 1988: 7).

German Colonization

At first Germany's domination over the peoples of Namibia was "gradual," but over time, as indigenous resistance grew to German settlers impinging on their land in the early 1900s, Germany's control became more brutal and suppressive. Soon, the Herero became the victims of "brutal floggings and...reckless murders, many of which went unpunished," as did the rape of Herero women which was generally regarded as "commonplace" (Pakenham 1991: 306). Resistance to such mistreatment resulted in more violent and pugnacious German rule, however the uprisings continued. One such uprising in 1904 by the Herero, led the Germans to fire indiscriminately to protect their reign over the South West Africa colony. After this battle the Germans implemented their *Vernichtungsbefehl* (extermination order), which stated that all Herero on German territory, whether or not they were armed, were to be shot (Hearn 1999: 36). It is estimated that German settlers killed 75-80% of the Herero population, approximately 65,000 people. The population fell to around 16,000 from 80,000 and those Herero who were not killed were sent to German concentration camps or taken as prisoners to work on railroads. The

Herero were not the only group who resisted German rule, as the Nama population was also involved in uprising and their population decreased by 35-50% by 1911 (Katjavivi 1988: 8).

After fighting and killing off many of the indigenous people, German settlers began to live on the land formerly owned by the Nama and the Herero, and by 1913 the German population was around 15,000 people (Hearn 1999: 37). The Herero and Nama suffered the most, along with the Damara, because they inhabited the land most desired by German settlers in the northwestern, central and southern parts of the country. The Ovambo in the northernmost part of the country were largely unaffected by German rule because that part of the country was never brought under German control. To stop indigenous uprisings, the Germans took over their land, banned traditional organization, executed chiefs and headmen (Katjavivi 1988: 10-11). For as Katjavivi explains, German rule had three basic principles:

“First, land was taken from the Namibian people and made available to German settlers. Second, traditional social structures were destroyed to try to make Namibians subservient colonial subjects. Third, Namibians were used as forced labourers on the now white-owned land and the new mines and industries” (1988: 11)

He continued on to say that, “by 1911, most of the good land in the centre and south of the country that had previously been in African hands was white-owned” (Katjavivi 1988: 9). Other consequences of German rule are worth mention because they have resonating effects in Namibia still today. First, education was not provided to Namibians under the German colonial regime, except for missionary teachings of the Bible and the German language. Then, the Germans put in place a system of exploitation of the natural resources and labor in Namibia which intensified the divide between the “white wealth and black poverty” (Katjavivi 1988: 12). Finally, German colonization had effects on the population distribution in the country. As a result of the German colonists’ seizure of land away from indigenous peoples, conflict was

created among different ethnic groups. Through these conflicts the Germans were able to force indigenous peoples into “protection treaties” in return for land on “reserves,” demarcated areas assigned to each ethnic group (Katzao 1999: 10). It is no surprise that the land left for indigenous peoples was of low quality. The idea of designating land reserves was supported by missionaries as they could gain access to a single ethnic group in a specific geographical area, making it easy for them to spread their message and convert indigenous peoples (Katzao 1999: 10). The exploitation of resources, refusal to educate Namibians, and demarcation of land based on ethnic lines are all aspects of German colonization that have resonating effects in Namibia to this day, as they were continued by South Africa during their occupation of the country.

South African Occupation

Although they portrayed themselves as the “liberators” of Namibia after years of harsh German rule, the South African occupiers were hardly different from their predecessors in their policies, and in many ways brought even more inequality to the indigenous people of Namibia. During World War 1, at the request of the British government, who was ruling South Africa at the time, South African forces invaded German South West Africa and took control of the capital, Windhoek (Katjavivi 1988: 13). At the end of the war, the Allies used the League of Nations to deal with Germany’s colonies. Consequently, Namibia was expropriated to South Africa as a “mandated territory” on January 1, 1921 under a League of Nations Mandate which stipulated that South Africa would be responsible for promoting the “material and moral well-being, and the social progress of the inhabitants of the Territory” and that Namibia should be treated as a ‘sacred trust of civilisation’ (Imishue 1965: 67, Hearn 1999: 37). However, the irony is that South Africa did the polar opposite of what was specified in the League Mandate.

Instead of promoting “moral well-being” they imposed policies of racial segregation and discrimination when they brought the apartheid system to Namibia. Bradford describes the South African attitudes and policies in Namibia:

“Its Education policy, its health policy, its land policy, its attitudes towards missions, its attitude towards the prohibition of arms and liquor and towards native affairs in general, all revolved around the basic assumption that the African’s existence had only one important purpose – to serve white interests” (First and Segal 1967: 93)

These ideas are echoed by Katzao who states that there are two dimensions to South African rule, segmentation or further dividing the country by ethnic lines, and economic dependence of blacks on white settlers (1999: 3-4). To achieve these two objectives, South Africa continued to seize land for white settlers. In the 1920s, the Native Reserves Commission suggested that 10% of the land in the central and southern part of the country should be designated for indigenous Namibians, a number that amounted to 5 million hectares out of 57 millions hectares, although blacks accounted for 90% of the population at that time (Katjavivi 1988: 14).

Although the League of Nations was aware of the discrimination and mismanagement of Namibia maintained by the South Africans, and had stated its disapproval, it had little power to enact much change (Hearn 1999: 37). By the end of the Second World War, South Africa wanted to annex Namibia and argued that because the League of Nations was replaced by the United Nations, their League mandate over Namibia had ended (Hearn 1999: 37). The annexation was rejected by most UN member states as South Africa’s annual UN reports showed a lack of progress for indigenous Namibians. As Hearn points out, after 1948 South Africa stopped submitting progress reports to the UN due to mounting pressure and the “epic struggle on the future of Namibia, fought between the United Nations and South Africa, a battle that continued through to 1988” commenced (1999: 38). Throughout this long battle, South Africa continued its

racially motivated policies and in 1964 the Odendaal Commission, or Commission of Enquiry into South West Africa, produced a report that became the basis of their policies in Namibia. As a result of the Odendaal Commission report, Namibia was separated out into 12 ethnic groups each of which had their own assigned “homeland” where people were forcibly sent to live (Katzao 1999: 11). Furthermore, Katzao explains that: “the white population, which in contrast was very small, occupied 44 per cent of the land which was the richest in terms of mineral and agricultural resources. As a result, the ‘homelands’ came to serve as reservoirs from which cheap African labour for the country’s economy was drawn” (1999: 11). South Africa’s actions did not go ignored by the international community and Hearn reminds us that there were protests at the International Court of Justice demanding that South Africa’s repressive regime and quest for annexation be stopped (1999: 38). These protests strengthened the United Nation’s response to the situation and in 1968, the UN Security Council commanded South Africa’s withdrawal from South West Africa, which now was referred to as Namibia by the international community, and called their presence in the country illegal (Hearn 1999: 38).

As the struggle for Namibia between South Africa and the United Nations continued, many resistance groups were formed, although none of them gathered as much political support as SWAPO (South West African People’s Organisation). SWAPO initially tried to use diplomatic means to come to an agreement with the South African occupiers, but made no progress on this front. As Hearn explains:

“By 1961 it became clear that the United Nations would not intervene in the conflict to the extent necessary to force South Africa to agree to SWAPO’s aspirations (for example by implementing sanctions). This inaction on the part of the international community, coupled with growing repression at home, led to the end of SWAPO’s stance of non-violence and the start of an armed struggle. With military training in Egypt, SWAPO began a limited guerilla war, which resulted in an

overwhelmingly strong response from South Africa. SWAPO's main success during this period lay not in its military prowess but in its diplomatic abilities, which resulted in its formal recognition by the UN General Assembly as the sole representative of the people of Namibia in 1973" (1999: 39)

Key to the United Nations' recognition of SWAPO as representative of the people of Namibia was a large labor strike and a successful electoral boycott in which only 3% of eligible voters voted, as both were organized by SWAPO (Hearn 1999: 41). Throughout the 1970s the UN continued to pressure South Africa, to no avail. In 1978, a diplomatic mission called the Contact Group was sent to Namibia to assess the situation and determine the possibility of a ceasefire. Negotiations between South Africa, SWAPO, and the Contact Group resulted in the UN Security Council R435 resolution, which passed in September 1978 (Hearn 1999: 42). Through R435, all parties supported a United Nations Transition Assistance Group (UNTAG), which would be stationed in Namibia for 12 months to oversee the peaceful transition to independence. Furthermore, R435 and UNTAG would be responsible for initiating a "cease-fire, the restriction to base on both sides in the armed conflict, the repeal of all discriminatory laws within the territory, the release of all political prisoners, the return of refugees, national elections and the development of a constitution before final independence." (Hearn 1999: 43) Although R435 was passed in 1978, it would be another decade before Namibia achieved independence from South Africa.

Peace Negotiations and Independence

South Africa delayed and rejected R435, in part by using the Cuban presence and conflict in Angola as "their main rationale for rejection," knowing that the Reagan administration used a policy of "linkage" in which Angola and Namibia were consequently linked by their close proximity to each other (although their conflicts were not actually interconnected). The Reagan

Administration of the 1980s promoted this “linkage” and soon tied the withdrawal of South Africans in Namibia to the withdrawal of Cubans in Angola (Hearn 1999: 44). After an intensive series of negotiations between the United States, Angola, Cuba and South Africa – SWAPO was left out – a peace accord was signed in December 1988 that decided that R435 would finally be implemented, over 10 years after it had passed, in April 1989 (Hearn 1999: 45). Although this peace agreement and the realization of R435 were undoubtedly steps towards Namibia’s independence, no one clear reason can explain how country achieved its sovereignty after over 100 years of colonization and occupation. Conflict in Angola at the time had become increasingly violent and as Namibia was tied to the country through linkage, a compromise was very much supported by all involved parties. Although the United States played an important role by beginning peace negotiations, Hearn explains that, “comprehensive sanctions applied earlier would have removed the South Africans from Namibia sooner than the seven years it took ‘linkage’ to work” (1999: 51).

UNTAG began its 12-month mission in Namibia in April 1989 and United Nations supervised elections in November of that year saw a SWAPO victory and a strong showing from the opposition DTA¹ party in an election that was “declared free and fair” (Hearn 1999: 58, 181). Namibia ratified their constitution, “seen as one of the most progressive and protective of human rights in the democratic world,” in February 1990 and was granted full independence on 21 March 1990. The first President was Sam Nujoma, the leader of the SWAPO party (Hearn 1999: 201).

Although euphoric with their independence and freedom from South Africa, the policies instituted during colonization and occupation have lingering effects still very apparent in

¹ DTA stands for Democratic Turnhalle Alliance

Namibian society today. Since Independence, a mass migration of people have moved from rural to urban areas, looking for work in the mining, fishing and agro-processing facilities, which has decreased agricultural production. As a result, Namibia is still dependent on South Africa for much of its food supply (Katzao 1999: 5). Namibian agriculture is further limited by the country's lack of water and vast deserts. Furthermore, Katzao's description of South African practices of segmentation and dependence are evident in present-day Namibia. Namibia does not have its own industrial base to compete with South Africa, the majority of people are still separated by apartheid lines set in the late 1940s, and the wealth generated by Namibia's minerals and raw materials is still very unevenly distributed (1999: 3, 5, 9-10). The discriminatory policies throughout Namibia's colonial history have also made a huge impact on education.

Chapter 3: Educational History

Since independence, Namibia has struggled to create its own identity and form progressive national policies that can deal with the unique historical, geographical and educational problems in the country. Striving to create country-specific reforms especially in terms of education resulted in Namibia's implementation of "learner-centered" education. "Learner-centered" education focuses on the child as an individual and moves away from the policies of rote memorization common during colonial periods. This progressive type of learning allows students to explore and learn in a structured, but independent way. However, there are many obstacles towards the complete realization of this type of pedagogy. As Katzao explains, "In the case of Namibia, education and growth were not 'properly' related prior to independence due to historical/colonial underexploitation and underdevelopment of resources, especially human" (1999: 6). The colonizers, who measured Namibians' worth by their value as cheap labor, did not adequately pursue human development for Namibians, especially through education. Not only were Namibians "educated" in colonial schools to become the labor force for industrialization and economic enterprise by whites, schools were also used to "change cultural patterns considered to be pagan" (Katzao 1999: 6).

Denial of the Right to Education

Serious educational opportunities had been denied to Namibians for decades under German rule and when South Africa came into control in Namibia after World War I, the educational opportunities in the country were extremely limited. Only a handful of missionary schools had been built which taught almost exclusively German culture, the Bible, and the German language. South Africa's record for school-building was not much better, from the

beginning of the League of Nations Mandate designating their control of the Namibian territory in 1921 until 1940, only two government schools had been built, and not a single school had been built in the northern region between 1920 and 1960 (Katjavivi 1988: 27). A German colonial administrator, Rohrbarch, epitomized popular thought about African education at the time when he said that white Namibians should not educate Africans because, “to educate them is to give them contact with world movements and world thinking which, of course...inculcates such mischievous and intolerable ideas as democracy, the brotherhood of man, fundamental human freedoms, and the like” (Wellington 1967: 391, Amukugo 1995: 45).

Although colonizers did not want Namibians to have experience with the outside world and thus restricted educational opportunities, it is important to note that both formal and informal education existed in Namibia before colonization. Amukugo explains that informal education was based on learning traditions through observation of elders, while formal learning, defined as a teacher assigning a pupil tasks, could last for a few weeks to several years (1995: 32-33). Much of the formal learning was done as an initiation into adulthood and taught students the tasks required of them by the community. Further, she notes,

“Traditional African education can be said to have distinguished itself from western education in Africa in two basic ways, namely in so far as it evolved from an African environment, and as the learning process was directly related to a specific pattern of work in a particular society and was therefore relevant to the African society within which it functioned” (1995: 34).

It is important to recognize that informal and formal education existed before colonization to better understand how colonial policies of “homelands” and forced removal from land also affected the educational system in Namibia. Proper educational opportunities were not provided for Namibians, and colonial policies uprooted traditional African educational systems. Each ethnic group in the country had its own system of economic, political, educational and social

structures and regulations that were undoubtedly negatively influenced by colonial policies, including urbanization and forced relocation (Amukugo 1995: 35-36).

Introduction of Bantu Education

It was not until South Africa came into control that the schools in Namibia were centralized under the government (Amukugo 1995: 46).² Although the education system had been centralized, very little if any progress was made in terms of building schools and re-vamping the disorganized educational system that was in place in the early 1920s. To complicate matters, in the beginning of South Africa's occupation, there was little agreement between the missionary schools on curriculum for Africans, aside from the fact that lessons should be taught in Afrikaans in Rhenish Missionary schools, in English in Catholic schools, and an "ordinary course" of study for Namibians should last 4 years (O'Callaghan 1977: 97). In 1921, South Africa tried to standardize and create uniformity in the educational system with the Educational Act, which established compulsory education for whites³ and allotted minimal funds to African schools (Amukugo 1995: 47). By 1923, a conference was held to draft the curriculum for "non-white" school syllabi, one that was not markedly different from the German missionary schools. As Amukugo explains,

"A provisional syllabus was drawn up, which included Religious Instruction, reading and writing in the mother tongue, reading, writing and speaking Dutch or English, elementary arithmetic, singing and hygiene. In addition, manual instruction in woodwork, metal work, gardening,

² Although the Germans also had the power to centralize the education system, they did not exercise this during their colonial rule and instead relied heavily on missionaries to implement and develop the educational system for Namibians, although these efforts turned out to be completely inadequate in actually educating pupils.

³ As education was not compulsory for black Namibians only 38% of the African school-going population was in school, as compared to 99% of the white children in 1960 (Amukugo 52-53).

building, etc for boys, and needlework, basket-making, housework, etc for girls were offered.”

(1995: 47)

The educational system in the country continued to support colonial interests by focusing on these subjects for decades. When the Eiselen Commission, appointed to look into “native” education, published a report in 1951, their recommendations for Bantu Education added to the inferior position Namibians were given in terms of educational opportunities. The Commission’s report became the basis of the Bantu Education system, which began first in South Africa and expanded into Namibia in 1962 with the Bantu Education Act (O’Callaghan 1977: 99). The Bantu Education system, built on the policies of apartheid, was used to oppress Namibians (and black South Africans) by educating them to fit into their assigned position in the labor division, namely blacks were “educated” to become the low-skilled labor force, Coloureds⁴ were to be trained for skilled manual labor, and whites were prepared academically to hold managerial positions (O’Callaghan 1977: 111).

Concealed Content of Colonial Education

Bantu Education, although recommended by the Eiselen Commission was constructed by Dr. H. Verwoerd (Amukugo 1995: 57). He did not hide his intentions or his ideas about racial equality when he bluntly stated that,

“Natives will be taught from childhood to realise that equality with Europeans is not for them.

People who believe in equality are not desirable teachers for the Natives. Education must train

⁴ Coloureds, as an ethnic group in Namibia, refers to Bastards who are a group of mixed-race people, descendant from Cape Colony Dutch and indigenous African women. “Coloureds” was designated as a separate race by South Africa during apartheid.

and teach people in accordance with their opportunities in life, according to the sphere in which they live” (Tabata 6).

Although the content of Bantu Education seems progressive in its stated objectives – literacy in one’s native language, knowledge of technical skills, and knowledge of hygiene for protection of health – they concealed the true intentions and practices of the system (Amukugo 1995: 61-62).

First, the syllabus included some unusual features as, “Bible history and ethics was an examination subject, with an oral examination...and a written examination...so was hygiene.

However, arithmetic was not an examination subject” (O’Callaghan 1977: 106). What is most

disturbing is the re-writing of indigenous history that was presented as fact in the Bantu

Education system, or as Amukugo calls it the “concealed content of colonial education.” The

geography of Namibia was explained in a way that made it seem like the “homelands” created as

part of apartheid policy, had always existed. Textbooks shamelessly asserted that Namibian

history started with the colonists and portrayed indigenous Namibians as “intellectually inferior”

(1995: 94-96). The actual history of the Herero people for example was completely ignored in

courses, and instead the focus was on things that the Herero adopted from Europeans,

“The removal of the Herero people from their land in central Namibia and their subsequent restriction to semi-arid land in the northern part of the country were not mentioned. What seemed important for the young African children to know, in the colonialists’ eyes, was the beautiful dress the Herero women had inherited” (Amukugo 1995: 96).

It is obvious that the curriculum did not provide for the, “all-around social, emotional, and intellectual development of the pupils” and therefore at the end of eighth-year “the pupils knew

nothing beyond reading, writing and basic arithmetics, the Bible, and how to care for white

people’s homes, gardens and farms” (Amukugo 1995: 64). The lack of proper and historically

accurate curriculums was intensified under the Bantu Education Act because no person was

allowed to “establish, conduct or maintain any African school or native school, other than a Bantu government school, unless that school conformed to the requirements for recognition” (Amukugo 1995: 101). Many Namibians became disconcerted with such limited choice and opportunity for education, and by no means accepted colonial or Bantu Education passively.

Namibian Resistance

The battle for equal education for all in Namibia dragged on for most of the 20th century and arguably continues to this day. In fact, the first state school to be set-up by South Africa in Namibia opened in 1935 after protests about poor education by the Herero. The African Improvement Society (AIS) was created in 1946 to provide desperately needed adult literacy classes and to print a newspaper for Namibians. Further, in the late 1940s indigenous groups like the Damara, who started Fakkkel (meaning torch in Afrikaans), created organizations as a way to provide cultural and educational opportunities otherwise unavailable (Amukugo 1995: 103, Katjavivi 1988: 29).

When the Bantu Education Act was introduced, there was much criticism from oppressed Namibians and many people tried to start independent schools to “bypass racist policies” and provide an acceptable education to students (Katjavivi 1988: 28). In the 1970s and 1980s even more alternative schools were established all around the country by Namibians as a response to poor education offered by government (Amukugo 1995: 108). Many of these schools had difficulty staying open because they lacked the financial resources necessary to do so (Katjavivi 1988: 28). However, they are important because they demonstrate resistance to colonial educational opportunities.

An important point in Namibia's resistance to South Africa's oppressive educational regime came through Namibian interactions with South Africans. In the 1950s, Namibians had to go to South Africa for secondary school, as those facilities were not available in Namibia. This interaction informed Namibian students of the protests going on in South Africa and eventually led to the creation of the South West Africa Progressive Association (SWAPA) in 1958 which identified itself as a, "cultural body with political flavour" and encouraged students to do well in school by giving out scholarships, as well as organized cultural functions (Katjavivi 1988: 29-30). SWAPA and SWANU (South West African Union) were established in the 1950s as a form of resistance against the South African regime and thus were associated more as "political-cultural" organizations, and as such were unable to ever unite the whole student body of Namibia (Amukugo 1995: 114-115). Despite the failures of SWANU and SWAPA, by the 1970s students were united and the period from 1971-1973 saw an enormous amount of class boycotts against colonial education (Amukugo 1995: 116). As Amukugo explicates, the student protests were for access to acceptable education, and better social and environmental conditions in schools nationwide. These demonstrations,

"Mainly were in protest of Afrikaans as the medium of instruction in secondary schools, against corporal punishment in the form of beatings, the bad food that some of the students were served, and the authoritarian and ruthless attitude of the white teachers (who were about 80% of the teachers in secondary schools)" (1995: 116)

The punishment for involvement in these boycotts and protests was expulsion from school, although many students ignored that threat because the education they were given was of such low quality that it was deemed useless anyway. The protests continued throughout the 1970s and 14 schools in the northern region of the Ovambo were bombed or burned (Amukugo 1995: 120). In 1984, the Namibian National Student Organization (NANSO) formed as a means of

organizing students through the inception of “debate groups” and NANSO offices at schools in the Ovambo region (Amukugo 1995: 118-121). The student representative councils set up by NANSO at secondary schools allowed students to, “co-ordinate activities at the national level” and school boycotts from January to August 1988 were organized through this channel (Amukugo 1995: 123, 126).

As students were stepping up their resistance to South African rule through boycotts and protests, peace talks were being negotiated to give Namibia its independence after 100 years. With this independence, came the opportunity to reform the horrible policies embedded in the educational system.

English As the Language of Instruction

A difficult decision to make after independence was to determine which language schools should use to educate pupils. Afrikaans had been used during apartheid and many students resented the language and boycotted its use. Up until the 1980s, it was taught in schools, which made it the national language. English was the second most common medium of instruction, although students demanded it to be the first language of instruction (Amukugo 1995: 87).

During colonization and the Bantu Education period, the emphasis of education was on literacy in one’s ‘native language,’ which seems, initially at least, to be a positive development. In actuality, this policy was used as a means of further segregating ethnic groups and perpetuating the system of “assigned” labor positions. Literacy in one’s native language,

“Did not only undermine the unity of the African people, but was part and parcel of the ideology of ‘separate development’ embodied within the reserve system. Literacy in official languages, on the other hand, was necessary to enable workers to sign documents whose content they would not

understand, as the limited education they received would destine them to a semi-literate condition” (Amukugo 1995: 62).

During the colonial periods, when instruction was given mainly in Afrikaans, English or German, all foreign languages, a communication gap developed in students that affected their potential to learn, and decreased the involvement of parents in their education. Most students did not have help on their homework because their parents could not read or write themselves in their mother tongue, and especially not in Afrikaans or English (Katzao 1999: 73). To ensure that parents are involved and can help their children with homework without “being intimidated by language,” and to lessen this “communication gap,” the Ministry of Education and Culture now promotes the use of mother-tongue languages in the Lower Primary levels (Grades 1-3). After Grade 4, the medium of instruction will transition from the mother-tongue language to English (Katzao 1999: 71, Amukugo 1995: 215).

English was chosen as the national language for a variety of reasons. First, it was chosen so that science-based subjects will be more accessible to students where, “technical/scientific terms has made it essential to be familiar with words that are accepted internationally” (Katzao 1999: 70). Second, it would be impossible to employ teachers who speak minority languages at the tertiary and secondary levels for economic reasons. Third, there is no agreement regarding which African language should be used to be the uniting language in schools. Finally, English was chosen to signify independence and to drop the use of Afrikaans in Namibia (Katzao 1999: 70).

The language policy is immensely important in determining how much students learn and how quickly the old colonial educational policies can be totally overturned. Although English is the national language, there are still issues involved in educating students in a foreign language. Furthermore, the mother-tongue policy, effective until Grade 4, can place some kids at a

disadvantage and adds to the current educational inequalities. Amukugo elucidates how although effective at involving parents, the language policy has some indirect effects,

“For example, the children from the ruling and middle classes would start off with English as a medium of instruction in Grade 1, which means that by the time they reach Grade 4, their skills in English are vastly superior to the English skills of children whose first three years at school were taught in the mother tongue. The two groups have to compete in secondary school on an equal basis. From a class analytical point of view, the mother tongue as a medium of instruction would place the working class and children of peasants at a disadvantage.” (1995: 215)

The question of language is important to keep in mind as most students from rural areas learn in their mother-tongue language for Lower Primary school. Inequality is still high in terms of education although the government has tried to put in place policies that will give more opportunities to those oppressed by colonial rule.

The Future After Bantu Education

Two decades after independence, Namibia is still struggling to reform its educational system. Although the Bantu system ended in Namibia in 1975, so began the period of “false decolonization” which covered up apartheid policies to appear more “equal” without actually changing the structure or institutional racism (Amukugo 1995: 62). African students were now required to attend school only through the third year, courses were taught in the mother-tongue language of students, and the education system now emphasized the creation of an African middle-class, as opposed to low-skilled laborers as had been the case in the Bantu system (Amukugo 1995: 62-63, 78). This hardly made the new system more equal. In 1975, the amount spent on a white pupil was 9 times higher than spent on an African pupil (Amukugo 1995:

68). The financial inequalities and uneven distribution of educational resources continued until independence.

The educational system was in ruins when Namibia gained independence and many of the principles of the Bantu Education system still existed. First, African children started schooling later than 7 years old, so they were beginning their education much later than white children. Second, education was still not compulsory at independence for Namibians and therefore some students never attended school. Third, there were high illiteracy rates in the country, very high dropout rates and a very low quality of teaching. Furthermore, teacher-training programs were not well developed or coordinated and overcrowded classes, with ratios of 1:60 or more, were common (Amukugo 1995: 193-197).

As one of its first tasks to reverse these unequal policies, the government guaranteed the right to compulsory state-provided education in its Constitution and tried to reform the education so that it would be “non-racial, non-ethnic and non-sexist” (Amukugo 1995: 197-198). The new curriculum, which included “learner-centered” teaching, was well received, but some criticized the government for not placing enough emphasis on teacher education. As Katzao points out, almost a decade after independence, in 1999, “approximately 14 000 teachers out a total of 18 000” were “considered unqualified” (1999: 97-98). One issue involved is that many teachers were, and still are not, fluent in English themselves. Katzao further claims that secondary school teachers are under-qualified in terms of language skills and that,

“One of the major issues that should have been addressed prior to educational reform was the question of teachers’ qualifications, including English language skills, both written and verbal. The government should as part of its investment in post-primary education seriously address the question of teacher training in the country” (1999: 96).

Teacher training is essential not only for implementation of “learner-centered” policies, but also for the development of the country. However, a USAID sponsored study by the Ministry of Education concluded that, “unfortunately we cannot eliminate our shortage of well-prepared teachers very quickly, perhaps not until the next century” (1999: 82). There has been progress in teacher education, though, as the Basic Education Teacher Diploma (BETD) has been created to increase congruity in curriculum and preparedness of teachers in making lessons relevant to each student (USAID 86). In order to fully reform the educational systems and undo the wrongdoings of the past, teachers must be trained so as to facilitate equal educational opportunities for all. Education can and should lead to critical thinking and problem-solving skills, crucial to creating a better future in Namibia.

Chapter 4: The Origins of Environmental Education

Environmental Education: Definition and Goals

The concept of environmental education (EE) has been discussed and debated for decades, beginning in the 1960s. Some scholars argue that the topic came about as the population became more aware of environmental problems and wanted to study these issues in more depth. Others think that environmental education began to replace earlier subjects like conservation education because the urban population no longer required the agricultural skills provided in conservation courses (Disinger “Definitional” 2005: 20). Stapp proposed one of the first definitions for environmental education in 1969. He postulated that because humans had become more urban, and were no longer directly dependent on natural resources as they had been in more rural areas, they had also become increasingly unaware of their natural surroundings and their role in the environment (1969: 33).

Urban communities began to face new challenges including, “a lack of comprehensive environmental planning; indiscriminate use of pesticides; community blight; air and water pollution; traffic congestion; and the lack of institutional arrangements needed to cope effectively with environmental problems” (Stapp 1969: 33). These problems, Stapp argued, could not be solved simply by governments or elected officials; they also required citizens who could play a role in mitigating environmental damage. Consequently, in order to solve environmental problems citizens must be educated so that they can pressure elected officials, demand accountability for environmental damage to their communities, and modify their own behavior. However, prior to the development of environmental education, no comprehensive approach to environmental protection and environmental sustainability existed.

Environmental education’s antecedents -- conservation education, nature study, and outdoor education -- focused on isolated parts of the environment creating awareness about only subject specific environmental issues (Disinger “Definitional” 2005: 19; Stapp 1969: 34). In particular, conservation education was concerned with conserving human resources, nature study focused on “putting the child into intimate and sympathetic contact with the things of the external world,” and outdoor education was used to “teach outdoors was is best taught outdoors, and teach indoors what is most appropriate there” and is often associated with school camping trips (Disinger “Definitional” 2005: 19). While these fields were important in promoting awareness of the biodiversity of animals and plants, they failed to see the environment as a complex system of biological interrelationships and that humans are also part of the environment. This sparked a need for a more encompassing and holistic approach in which humans are educated in regards to their “relationship to the total environment” and in the early 1960s these sub-disciplines began to be replaced and expanded by “environmental education” (Stapp 1969: 34; Disinger “Definitional” 2005: 20). Table 1, taken from Schoenfeld, describes the early transition to and development of modern-day environmental education.

Table 1: Comparison of Characteristics of Earlier and Present Environment Related Education (Schoenfeld 1969: 1-4)

<i>Yesterday</i>	<i>Today</i>
Compartmentalized	Comprehensive
Parochial Interests	Broader Awareness
Local	Global
Rural	Urban
Appended Rationales	Indigenous Concern
Evangelical	Ecological

Resource-centered	Man-centered
Terrestrial	Universal
Biophysical Science	Social Studies
Gospel of Efficiency	Quest for Quality
Technological Impetus	Public Involvement
Unilateral solutions	Open-ended Options
Elementary Education	Adult Education
Print Media	All Media
Hunch	Research
Business as Usual	Sense of Urgency

In 1969 the definition written by Stapp for this new, all-encompassing concept of “environmental education,” is as follows:

“Environmental education is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution” (1969: 34)

Moreover, Stapp outlined the four goals of environmental education:

1. “To help individuals acquire a clear understanding that man is an inseparable part of a system, consisting of man, culture, and the biophysical environment, and that man has the ability to alter the interrelationships of this system
2. To help individuals acquire a broad understanding of the biophysical environment, both natural and man-made, and its role in contemporary society
3. To help individuals acquire a fundamental understanding of the bio-physical environmental problems confronting man, how these problems can be solved, and the responsibility of citizens and government to work toward their solution
4. To help individuals acquire attitudes of concern for the quality of the biophysical environment which will motivate citizens to participate in biophysical environmental problem-solving.” (1969: 34-35)

In other words, the over-arching goal of environmental education is to educate in order to motivate people to act for, and not against, their environment. In order to act, citizens must be informed and aware of the environmental impact of human activities that can negatively affect their communities. In the 1970s, two more “working” definitions of environmental education were published that built upon Stapp’s ideas⁵ and made the concept more globally applicable. First, Stapp points out that the working definition of the International Environmental Education Conference in Belgrade in 1975 stated that,

“Environmental education should be an integral part of the educational process, aimed at practical problems of an interdisciplinary character, build a sense of values, and contribute to public well-being. Its focus should reside mainly in the initiative of the learners and their involvement in action and guided by both the immediate and future subjects of concern” (Disinger “Definitional” 2005: 24; Stapp 1969: 36).

And in 1977, the UNESCO-UNEP Intergovernmental Conference on Environmental Education in Tbilisi, Georgia proposed another working definition,

“Environmental education is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and has the attitudes, motivations, knowledge, commitment and skills to work individually and collectively towards solutions of current problems and the prevention of new ones” (Stapp 1969: 36)

These definitions have been expanded to include formal and informal educational approaches and the idea that environmental education can be “education about the environment, education for (the preservation of) the environment, and education in the environment” (Roth 1973: 38-39;

⁵ These working definitions were based on Stapp’s environmental education definition as he was a participant at the Belgrade and Tbilisi conferences and helped shape both new “working” definitions through his position as International Director of Environmental Education for UNESCO.

Lucas 1980: 32-37). Regardless of definition, the ultimate goal of environmental education is most often stated as “environmental literacy” meaning learners become environmentally literate, environmentally competent, and environmentally dedicated (Harvey 1977: 67).

Challenges for Environmental Education

Many challenges potentially obstruct the goals of environmental education. First, education about the environment alone does not necessarily lead to environmental action or positive changes in one’s behavior. As with other social sciences, environmental education should be presented in a way in which students can make their own choices and not be pressured into action by “preachy” educators. John Hug warns that environmental educators can be both environmentalists and teachers, but must present factual information to students so they can develop skills and participate in environmental decision-making (1977: 73). Other scholars agree that the role of the environmental educator is not to “convert” students to one perspective on the environment, but to promote critical thinking skills in students so that they can make responsible behavioral choices (Disinger “Definitional” 2005: 30-31).

Another challenge lies in defining the topic itself. Environmental education does not necessarily “fit” into a specific educational subject. As Disinger explains,

“First and foremost, environmental education is by its nature interdisciplinary, but neither school organizational patterns nor teacher certification programs (for high schools and middle schools) make allowance for anything that is not tied to one of the established disciplines. There is at least as much logic in associating environmental education in schools with the social studies as with the natural/physical sciences, but the way that environmental education has evolved has made that impractical. Thus, a major tension is unavoidable: some aspects of environmental education fit into existing curricula as science, and some as social studies, but the two are not coordinated with

one another. Furthermore, the complete environmental education package cannot appropriately be labeled a subheading under either science or social studies, or of any subject area, but the educational system is unable to adjust to that. Further, no one believes that there is room to add a new subject, environmental education, to the curriculum” (“Tensions” 2005: 5)

Environmental education has always been viewed as an extension, or an optional topic, and not a distinct discipline to be studied. Disinger explains that environmental education is “inserted in modules, packets, pieces, even single lessons” throughout curriculums, especially in the United States. This allows for the environment to only exist in students’ minds in fragments, with its amount of importance being dependent on the teachers desire to incorporate the lessons where they see fit. Many environmental educators are discouraged and disappointed with the lack of focus on the total environment and its exclusion from subjects outside of the social sciences. As Disinger points out,

“The environment, and environmental concerns, abound with convenient, striking examples that can illustrate key concepts in many other subject areas. Thus, much environmental teaching and learning take place in science and social studies classes – and in English, math, and many other subject area classes. However, this is frequently on a “catch-as-catch can” basis. Whatever it is, it is neither sequential nor cumulative; it does not build logically or rigorously on environmental concepts. It is also unlikely to afford balanced considerations of multi-dimensional issues”

(“Tensions” 2005: 5)

Thus, proponents argue that environmental education needs to be incorporated into students’ curriculum as a required subject and links should be made between the environment and all subjects.

Finally, there is the challenge in having well-trained teachers. Although southern Africa is ahead of the world in terms of defining a more holistic version of EE, it is vital that teachers fully understand the topic and can adequately convey it to their students. As Smego argues,

“The future of environmental education in Namibia will depend on communication, co-operation and funding. One of the gaps that needs attention is helping teachers to develop a better understanding of just what environmental education is – that it is not only about biology, but encompasses social and economic issues which are crucial to the development of Namibia. This is being addressed in part by government curricula in which environmental education is now cross-curricular, with environmental issues appearing in agriculture, life science and life skills subjects” (2002: 4).

Environmental education will not be successful if teachers are not trained so that they adequately make the connection between the environment and students’ everyday lives.

Namibia’s EE Policy

As part of the educational reform of Namibia after independence, a greater focus was placed on the environment. In an unpublished report for the Supporting Environmental Education in Namibia (SEEN) organization, Viktoria Paulick explains that formal national policy on environmental education was first written during this period and was headed by the Ministry of Wildlife, Conservation and Tourism (MWCT) with the help of other stakeholders and government ministries to ensure that environmental education policy would promote: 1) Co-operation between ministries, institutions and NGOs, 2) Co-ordination of activities and efforts, and 3) Sharing of resources (facilities, staff, materials). Throughout 1992, the MWCT continued to hold workshops to define environmental education and determine who would be responsible for its implementation. It was decided that coordination was needed between stakeholders, and

so in 1993 the Rössing Foundation took up the job of heading the USAID-funded EE project in Namibia. In 1995 the Namibian Environmental Education Network (NEEN) was launched to aid the EE policy project and there were numerous workshops that helped shape EE policy under the Rössing Foundation until 1998 (Paulick 2003: 1-2). NEEN was a key player in this, and as Paulick points out,

“An important role of the network is to provide a cohesive voice in which to express environmental education concerns at a national and policy-making level. Through the Environmental Education Project - funded and organized for - a national policy for environmental education in Namibia is being drafted. The Environmental Education Project sponsorship of NEEN representatives at regional and international meetings has enabled the network to have a voice in the development of environmental education in the SADC region” (2003: 3)

When the USAID-Rössing Foundation EE project ended, NEEN began to look for other sources of financial support. Unfortunately, the organization struggled with finding donors and thus the implementation of EE policy was negatively affected. Viktoria Paulick outlines the early development of EE policy in the country from 1990-1999 as follows:

- After independence, stakeholders decided that the Ministry of Wildlife, Conservation and Tourism (MWCT) was the main stakeholder/leader for environmental education in Namibia. The Green Plan, developed by the MWCT, included a section on environmental education and was generally seen by government officials as an EE policy.
- Funding was provided by USAID to launch the EE Project under the leadership of the Rössing Foundation. Although the Rössing Foundation headed the project, the responsibility for any EE policy advancement lay with NEEN, a new organization with an NGO base.
- When the policy was proposed by NEEN to the Ministry of Environment and Tourism and Department of Environmental Affairs, it was not incorporated because no new policies were being accepted or added at that time.

- By 1998, NEEN considered housing the policy with a different ministry (i.e. MBEC - Ministry of Basic Education and Culture). Unfortunately, that same year brought the end of the Rössing Foundation EE Project and therefore the loss of NEEN funding and the full institutional support of Rössing. EE in the country consequently suffered from lack of financial resources provided to NEEN.
- NEEN Committee members presented the EE Policy to the Presidential Commission. However, both the Presidential Commission on Education, Culture and Training and the Secretary of MBEC recommended that the correct course of action for EE policy integration and implementation in the MBEC was through National Institute for Educational Development (NIED).⁶

Environmental Education implementation in Namibia suffered from insufficient funds and a shirking of responsibility for policy development between ministries and organizations.⁷ This did not, however, stop environmental education centers from opening up in the country, starting in the late 1980s and early 1990s.

⁶ Outline of EE Policy Developments came from, “A Brief History and Analysis of the Development Process of the Namibian National Environmental Education (EE) Policy” by Viktoria Paulick (Keding), 2003.

⁷ To this day EE policy has not been officially adopted in Namibia. At the recent NEEN conference at the Waterberg in August 2010, it was mentioned as something that should be prioritized and accepted by the government and cabinet – some 10 years after the policy was written (Keding interview 2010).

Chapter 5: NaDEET Background

The Namib Desert Environmental Education Trust (NaDEET) runs an environmental education center in Namibia and was established as a non-profit in 2003 in the Namib Desert to provide environmental education to residents of southern Namibia. NaDEET's three projects include an environmental education center, providing practical work experience to university students majoring in nature conservation, and publishing and distributing environmental literacy materials nationwide. NaDEET's environmental education center primarily educates elementary and high school student groups⁸ for weeklong, overnight stays where students learn through informal and formal activities about sustainability.

NaDEET was created to be unique from other environmental education centers as it is a “model of sustainable living” where students learn that “the environment” is not only made up of plants and animals, but rather it is the place where humans and biology must live in harmony. Daily activities at the center focus on four areas - water, waste, energy and biodiversity – and each day has a theme and specific activities that tie into that theme. For example, students participate in a biodiversity dune walk to learn about the unique plants and animals in the Namib Desert, make recycled firebricks out of newspapers and egg cartons, and participate in scientific experiments that explain how solar panels and solar cookers work. When not involved in formal class activities, students learn informally to live sustainably by solar cooking their meals, monitoring their daily trash production, and keeping track of their water and energy usage throughout the week.

⁸ NaDEET primarily educates student groups, but a new Community Group project for adults began this year and the Center has hosted adult groups in the past.

These activities are age-appropriate and assume that students who attend the programs can speak, read and write in English. However, one barrier to successful environmental education in Namibia at centers like NaDEET is that many students do not speak English as a first language and for many of the historical, social and economic reasons outlined in the beginning of this paper these students are also often not at the same academic level as their peers.

The Issue

Due to its location, NaDEET works to bring schools from southern Namibia to its environmental education center. As part of the organization's three-year strategic plan, NaDEET hopes to have all schools in the Hardap (southern) region of the country, and schools from the southern Karas region as well, come to NaDEET Center for the weeklong EE program. However, many students, especially those living in rural areas, are not completely fluent in English. These groups, although often financially sponsored to come to NaDEET Center, face another obstacle to environmental education, as they cannot fully participate in the program when activities require English reading, writing and speaking skills. This is not an issue specific to NaDEET, rather, it is widespread in many developing countries coping with the lingering effects of a foreign national language after long periods of colonization. For the purposes of this project, however, I will focus my efforts on NaDEET and try to answer the question of how to design an environmental education program for English Language Learner (ELL) participants in sub-Saharan Africa, keeping in mind that many of these students are also behind their peers academically. As shown in the following survey results, ELL students at NaDEET did not positively change their attitudes towards the environment, and showed general confusion on what is "good" and "bad" for the environment, after the weeklong program. In other words, they

did not comprehend the material as well as the Upper Primary students and an ELL-specific curriculum is necessary for NaDEET to continue its mission of educating all Namibian about sustainability.

A Case Study: P.J. Tsaitsaib JSS

As a means of further understanding the scale of the language deficiency, I asked some questions to the principal of P.J. Tsaitsaib Junior Secondary School. This particular school visited NaDEET Center in July 2009 while I was a volunteer. As mentioned earlier, English is not often used as a language of instruction in Namibia until grade 4. In grades 1-3, English is taught as a separate class and instruction is in the students' native tongue.

As the principal of P.J. Tsaitsaib explains, the students at his school learn some English in grades 1-3, but the main language of instruction is Nama. The principal estimated that at P.J. Tsaitsaib, none of the kids speak English as a first language nor do they use it at home with their families. This means by grade 5, when learners could attend NaDEET's Upper Primary program, they are not fluent in English and they do not have much experience with the language. It is important to note that this is not only an issue for students while at NaDEET's environmental education center. The principal, David Topnaar, indicated that last year out of 60 10th grade students, only 13 went on to senior secondary school and one could speculate that this is likely due in part to a lack of English language skills (and also due to the high unemployment faced by the area). However, the principal also indicated that the school's teachers that accompany students from P.J. Tsaitsaib to NaDEET would be willing to translate EE lessons from English into the students' native language. P.J. Tsaitsaib proves to be a useful case study as many other

schools face the same scenarios and other teachers who visited NaDEET Center verbally echoed the principal's responses (Topnaar interview 2010).

NaDEET has an open-door policy to allow participants from all income levels to visit the Center⁹ and argues that rural schools like P.J. Tsaitsaib are usually in the most need of environmental education as their livelihoods often directly depend on the natural environment. P.J. Tsaitsaib School is not a rare case. In fact there are about 58 schools in the Hardap region alone and approximately 25% of these southern schools would qualify for the Lower Primary program for ELLs and are in need financial support to visit the educational center (Keding Interview 2010). NaDEET would like to educate these Namibians so that they can make more sustainable choices. Due to the fact that NaDEET often operates on a word-of-mouth basis, it is imperative that these rural students have a positive experience at the Center in order to provide an incentive for other students to make the trip to NaDEET. Having a Lower Primary program that is catered to ELL needs would encourage other schools to come to the Center and learn about sustainable living. Moreover, NaDEET can only achieve its mission, "to protect the natural environment of Namibia by educating its citizens to practice a sustainable lifestyle," by utilizing appropriate EE curriculums for all participants, and especially by having an ELL-specific program.

⁹ The cost of visiting the center is around N\$150 or approximately \$20 USD per participant per day, which is substantially higher than many participants can afford. However, all center visitors are asked by NaDEET to contribute as much as they can, even if it is only a very small fraction of the total cost (i.e. N\$5/day).

Chapter 6: Methods

In order to gain insight on the issue, I conducted continuous informal interviews with teachers, students and NaDEET staff, developed a case study of a Lower Primary school, and used both qualitative and quantitative methods to further understand how an ELL-specific program could benefit students at NaDEET throughout my time at the organization. Using participant observation, in my roles as Environmental Educator and Center Assistant, I was able to see how much learners struggled with certain lessons and scientific concepts. I discussed these issues formally and informally with students and teachers to seek the best possible solution: design an ELL-specific program. Observation gave important insight, but was not the only way to assess understanding learners' comprehension of the material. Thus, a questionnaire was designed to survey students' attitudes and to pinpoint the areas that needed to be emphasized in a Lower Primary program.

Survey Introduction

In the second half of 2009, NaDEET staff, including myself, conducted a survey with visiting students to NaDEET Center. The survey was intended to have several objectives: to better understand the environmental knowledge of learners prior to a NaDEET visit; to find out how effectively NaDEET is transferring environmental knowledge and altering attitudes towards the environment during a program; and to establish potential links between differing environmental opinions amongst children. The results are based on student responses to statements and questions using a Likert scale from 1-5 where 1 = Strongly Agree, 2 = Agree, 3 = Don't Know, 4= Disagree, and 5 = Strongly Disagree. However, some of the survey questions have been reverse coded so that the highest number on the Likert scale always equals the most

positive environmental attitude, thus the scale for some questions (noted below) is: 1 = Strongly Disagree, 2 = Disagree, 3 = Don't Know, 4 = Agree, and 5 = Strongly Agree.

The findings from the Lower Primary students, who participated in the Upper Primary program, were compared to students who do qualify for the Upper Primary program. This information was used to determine whether or not there is a gap in the learning at NaDEET Center for Lower Primary students. If a gap was found to exist, the survey would provide further support for the creation of a Lower Primary program. The survey was administered to 6 school groups from 4 different schools and was written by Benjamin Burghart (a fellow MAGIS student), with input from NaDEET's Director, Viktoria Keding and myself.¹⁰ Unfortunately, only one Lower Primary school group was given the survey, as they were the only rural primary school to attend NaDEET's program after the survey was written. First, I will compare the arrival and departure surveys for Cambridge Primary School, the school that would qualify for a LPP because all of the students are ELLs, followed by the combined student responses from 3 Upper Primary schools.

Survey Sample

The following survey was given to assess basic environmental attitudes, the probability that students will engage in environmental action after the weeklong program, and to determine how much students had learned after their week at NaDEET. It is based on the responses of four schools that attended weeklong programs at NaDEET Center respectively over a period of six weeks while I was a volunteer. Eight different schools with 11 groups attended the Center while

¹⁰ A separate survey was written specifically for secondary school students, and those results have not been included in these findings.

I was a volunteer, but 3 schools did not take part in the survey because it had not yet been written. The 5 remaining schools took the survey, but one was a secondary school and those responses are not included in this report. Therefore, the survey includes responses from 36 students at Cambridge Primary, a Lower Primary qualifying school, and 174 students from 5 school groups from 3 Upper Primary schools, Danie Joubert Primary School, Dr. Frans Aupa Indongo Primary School, and Die Deutsche Höhere Privatschule. The three Upper Primary schools are from more urban areas and are located either near or in the capital city of Windhoek, or the town of Mariental in southern Namibia. All student respondents, except 1, were in grades 6 or 7 and within the age range of 11 and 16 years old.

Tables 1- 4 show the frequency statistics of Upper Primary and Cambridge Primary respondents in order to compare the students’ grade level, age, sex, and place of residence.

Table 1: Grade Level Comparison

Upper Primary Statistics: Grade Level			
	Grade	Frequency	Percent
Valid	6	108	62
	7	66	38
	Total	174	100
Missing		0	
Total		174	

Cambridge PS Statistics: Grade Level			
	Grade	Frequency	Percent
Valid	5	1	2.8
	6	10	27.8
	7	23	63.8
	Total	34	94.4
Missing		2	5.6
Total		36	100

Table 2: Age Comparison

Upper Primary Statistics: Age			
	Age	Frequency	Percent
Valid	10	1	0.6
	11	14	8.05
	12	76	43.7
	13	62	35.6
	14	14	8.05
	15	3	1.7
	16	1	0.6

Cambridge PS Statistics: Age			
	Age	Frequency	Percent
Valid	12	4	11.1
	13	17	47.2
	14	9	25
	15	3	8.3
	16	1	2.8
	Total	34	94.4
Missing		2	5.6

	Total	171	98.3
Missing		3	1.7
Total		174	100

Total		36	100
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Table 3: Sex Distribution

Upper Primary Statistics: Sex			
	Sex	Frequency	Percent
Valid	Male	81	46.5
	Female	84	48.3
	Total	165	94.8
Missing		9	5.2
Total		174	100

Cambridge PS Statistics: Sex			
	Sex	Frequency	Percent
Valid	Male	13	36.1
	Female	20	55.6
	Total	33	91.7
Missing		3	8.3
Total		36	100

Table 4: Location of Family Home

Upper Primary Statistics: Family Home			
	Home	Frequency	Percent
Valid	City	86	49.4
	Town	56	32.2
	Farm	5	2.9
	Village	6	3.4
	City/Farm	4	2.3
	Total	157	90.2
Missing		17	9.8
Total		174	100

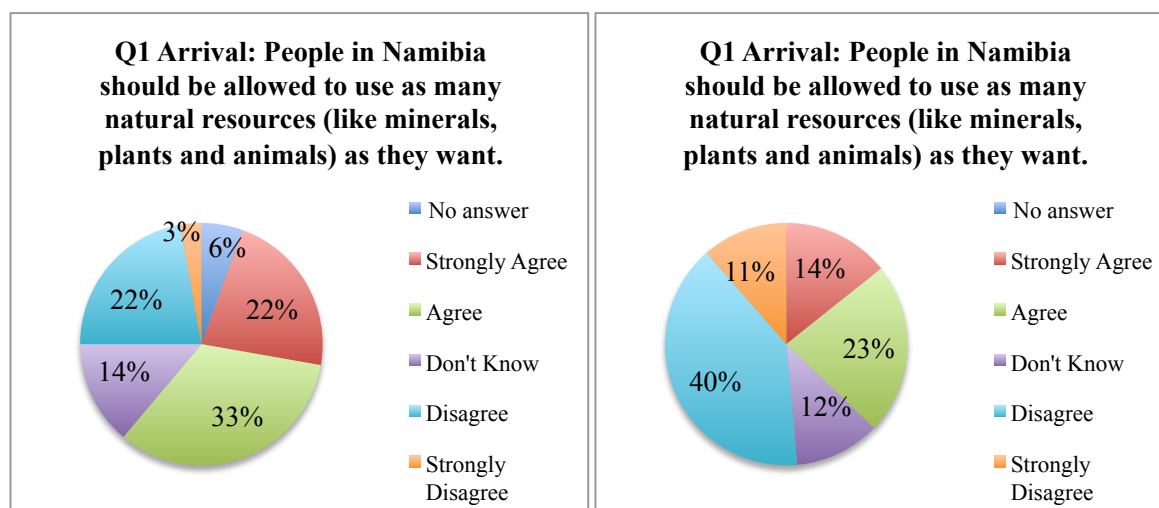
Cambridge PS Statistics: Home			
	Home	Frequency	Percent
Valid	City	2	5.6
	Town	3	8.3
	Farm	15	41.7
	Village	15	41.7
	Total	35	97.3
Missing		1	2.7
Total		36	100

The survey is not meant to be complete or comprehensive, but rather is meant to provide insight into the experiences of ELLs and Upper Primary students at NaDEET Center. The results from students at Cambridge Primary are assumed to be similar to other ELL school groups that visit the center. Conclusions drawn from the results will be cautious, as there are admittedly errors in the wording of some of the questions, which could have resulted in confusion for students. The response rate was very high and most the survey questions had less than two missing responses. Language and literacy may also have been an issue, as well as social desirability in which students would choose the result that they think the researcher wants them

to give. Furthermore, the Likert scale may have been unfamiliar to some students and therefore the answers may not be completely accurate. The following is a broad interpretation of the pie charts reflecting student responses, which compares the agreement and disagreement with each statement or question. A higher mean always illustrates a more positive attitude toward the environment, and some questions have been re-coded to reflect this.

Presentation of Data

Figure 1a: Cambridge Primary Question 1



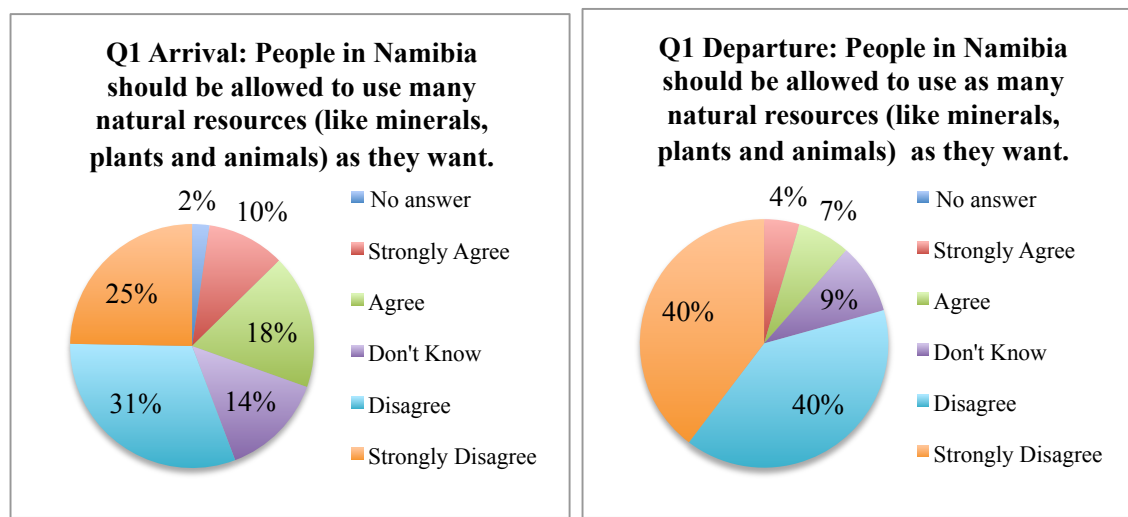
Arrival Mean: 2.47
 Arrival Median: 2
 Arrival Mode: 2
 Arrival Standard Deviation: 1.19

Departure Mean: 3.11
 Departure Median: 4
 Departure Mode: 4
 Departure Standard Deviation: 1.30

Upon arrival, the results were mixed. 55% of Cambridge students chose strongly agree, or agree, while 25% chose strongly disagree, or disagree. After the weeklong program, most students chose strongly disagree, or disagree (51% in total), but 37% still agreed with the statement. From these results, one can conclude that some students did change their attitudes throughout the week so that they were more positive towards the environment, but the shift is not as drastic as in the

Upper Primary responses, as almost 40% still agreed with the statement after the program and the “strongly disagree” responses did not increase much.

Figure 1b: Upper Primary Question 1¹¹



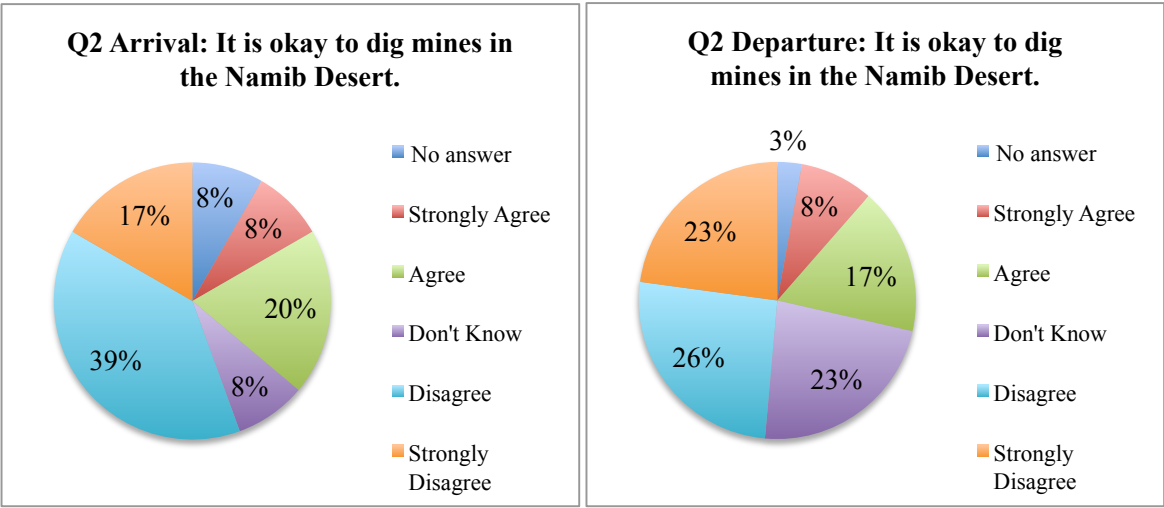
Arrival Mean: 3.43
 Arrival Median: 4
 Arrival Mode: 4
 Arrival Standard Deviation: 1.33

Departure Mean: 4.03
 Departure Median: 4
 Departure Mode: 4
 Departure Standard Deviation: 1.09

In question 1, attitudes seemed to have become stronger for the Upper Primary Students as the “disagree” and “strongly disagree” categories increased. Upon arrival, 56% of students disagreed to some extent, and this increased to 80% by the end of the week. This means that the “agree” percentage also dropped drastically since the beginning of the week, from 28% to 14%.

¹¹ The student responses from Dr. Frans Aupa Indongo School were re-coded because the question was asked, only to that first school group, in the negative form: “People in Namibia should NOT be able to use as many natural resources (like minerals, plants and animals) as they want.” In order to make it easier for students to understand, as well as increase the validity of the survey, the question was asked in the revised positive form asked to all other Upper Primary schools and Cambridge Primary.

Figure 2a: Cambridge Primary Question 2

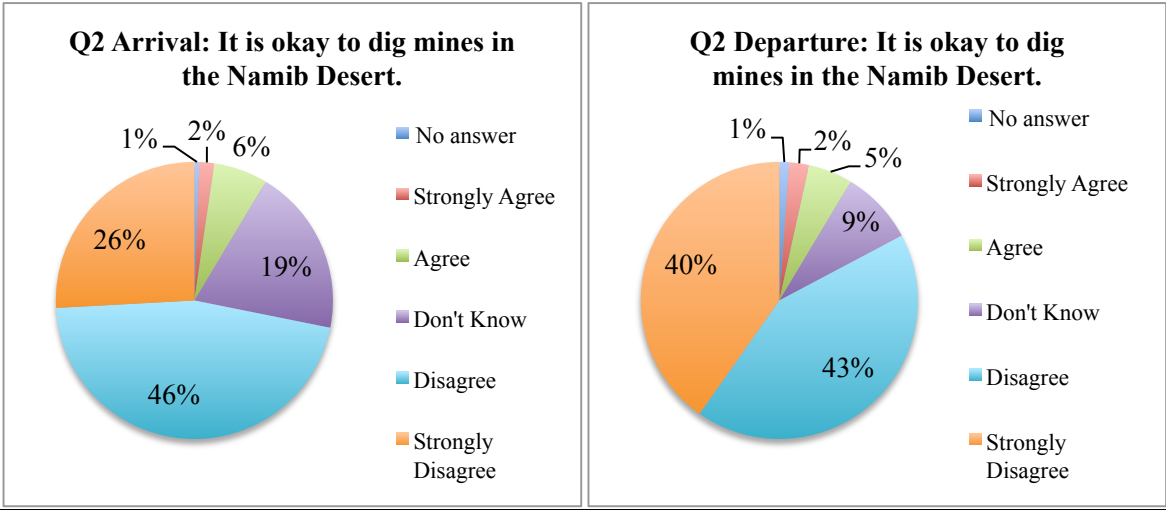


Arrival Mean: 3.39
 Arrival Median: 4
 Arrival Mode: 4
 Arrival Standard Deviation: 1.27

Departure Mean: 3.38
 Departure Median: 4
 Departure Mode: 3.5
 Departure Standard Deviation: 1.28

Most Cambridge students disagreed with digging mines in the Namib Desert upon arrival at NaDEET Center, 56%. However, after the program, 23% of the students did not know what to answer. Because the topic of mining was not specifically covered in the program, there may have been some confusion as to whether or not it is beneficial to the environment. However, the amount of students who “strongly disagreed” increased, so some students likely understood the question, but not the majority. On the other hand, the overall disagreement with digging mines decreased slightly after the program, from 56% to 59%.

Figure 2b: Upper Primary Question 2

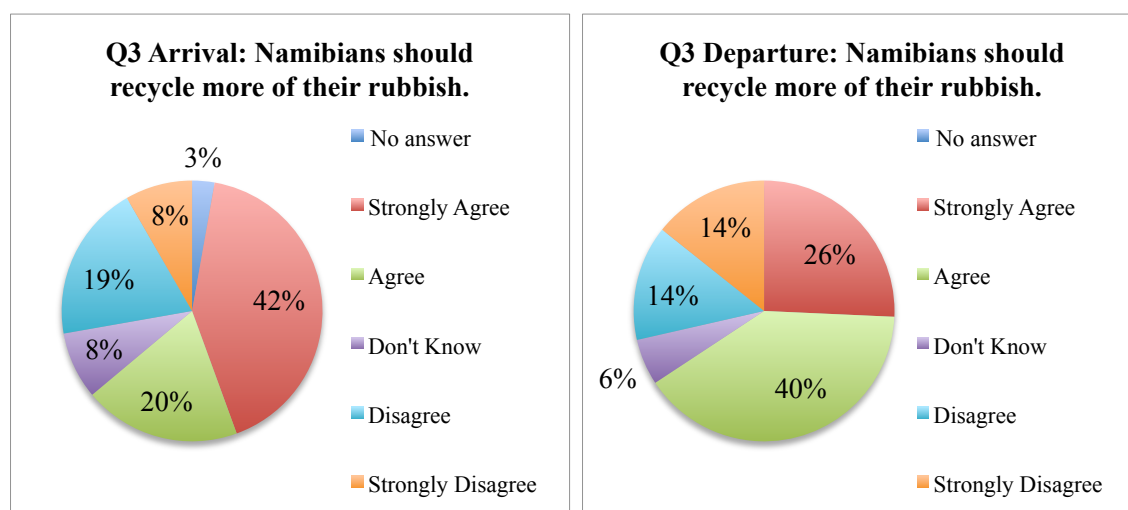


Arrival Mean: 3.88
 Arrival Median: 4
 Arrival Mode: 4
 Arrival Standard Deviation: 0.93

Departure Mean: 4.15
 Departure Median: 4
 Departure Mode: 4
 Departure Standard Deviation: 0.95

The majority of Upper Primary students changed their attitudes, although most students disagreed with digging in the Namib Desert when they arrived, 72%. By the end of the week, the “disagree” category increased to 83%, the mean increased, and the amount of students who answered “don’t know” decreased by 10%.

Figure 3a: Cambridge Primary Question 3



Arrival Mean: 3.69

Arrival Median: 5

Arrival Mode: 4

Arrival Standard Deviation: 1.43

Departure Mean: 3.49

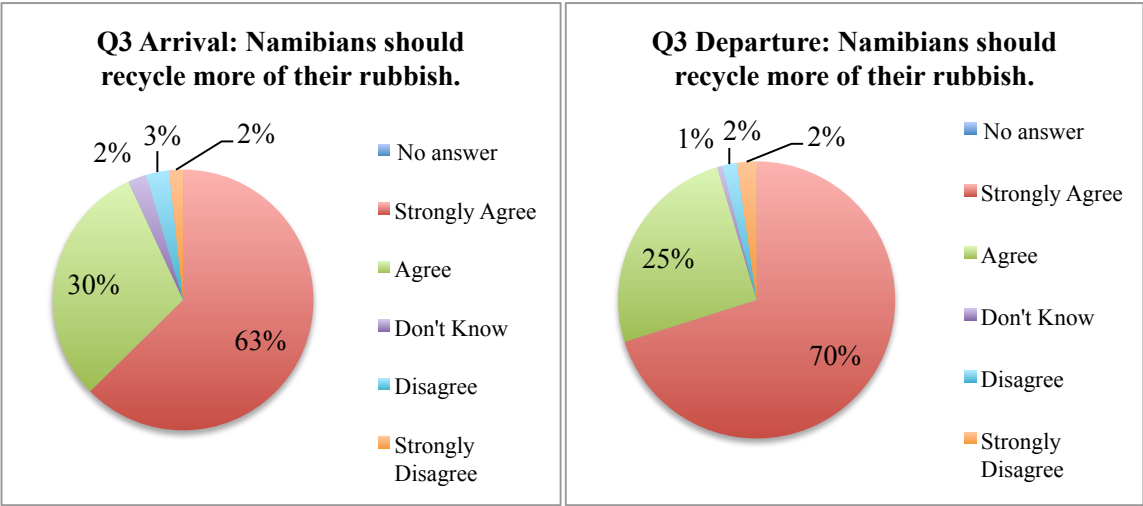
Departure Median: 4

Departure Mode: 4

Departure Standard Deviation: 1.40

Question 3 shows again that students did not drastically change their attitudes over the week, with 62% agreeing with the statement at the beginning of the week, and 66% of students agreeing by the end of the week. It is also important to note that the amount of students that strongly disagreed increased throughout the week, and the number of students who strongly agreed with recycling in the beginning of the week decreased.

Figure 3b: Upper Primary Question 3

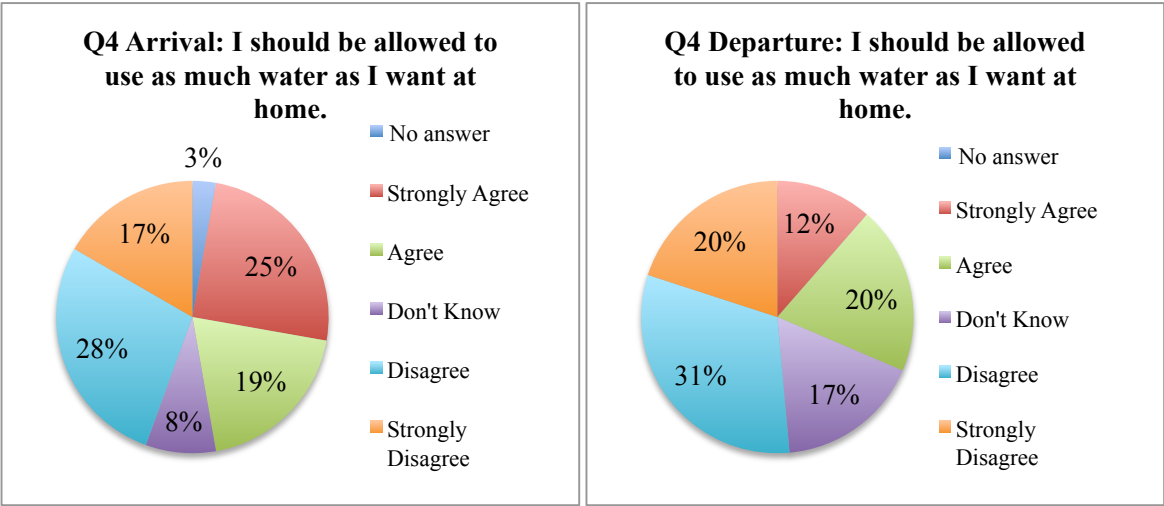


Arrival Mean: 4.49
 Arrival Median: 5
 Arrival Mode: 5
 Arrival Standard Deviation: 0.82

Departure Mean: 4.59
 Departure Median: 5
 Departure Mode: 5
 Departure Standard Deviation: 0.80

Upper Primary students’ opinions stayed pretty much the same, except for the 7% increase in students who “strongly agree” that Namibians should recycle more of their rubbish.

Figure 4a: Cambridge Primary Question 4

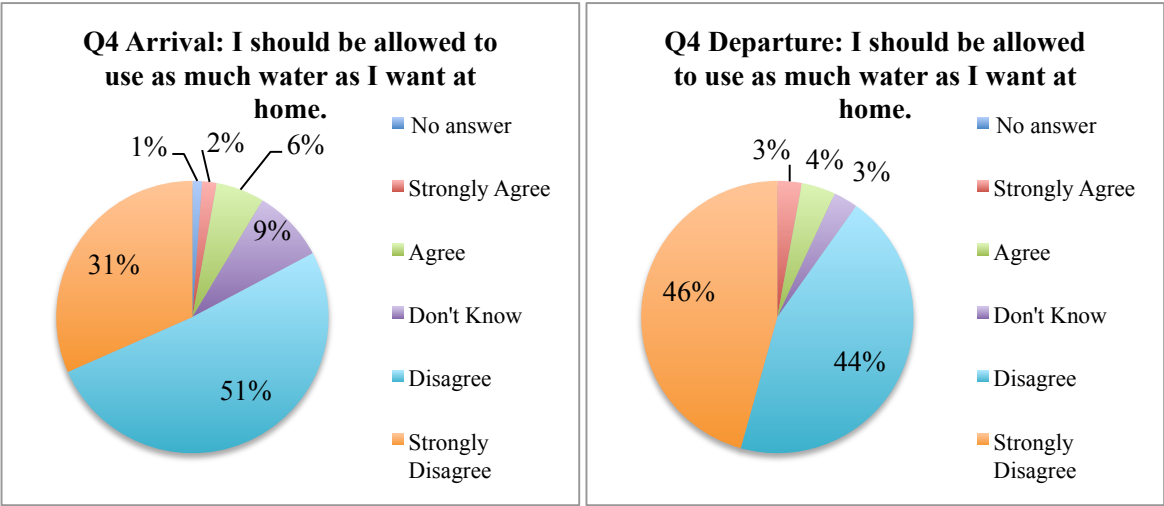


Arrival Mean: 2.91
 Arrival Median: 4
 Arrival Mode: 3
 Arrival Standard Deviation: 1.50

Departure Mean: 3.29
 Departure Median: 4
 Departure Mode: 4
 Departure Standard Deviation: 1.32

Mixed results are illustrated in the pie charts for Cambridge Primary students. There was a slight increase in disagreement, from 45% to 51%, and a decrease in “strongly disagree” responses, from 25% to 12%. However, the “don’t know” category almost doubled, which indicates that students did not fully understand water scarcity, even after the program.

Figure 4b: Upper Primary Question 4

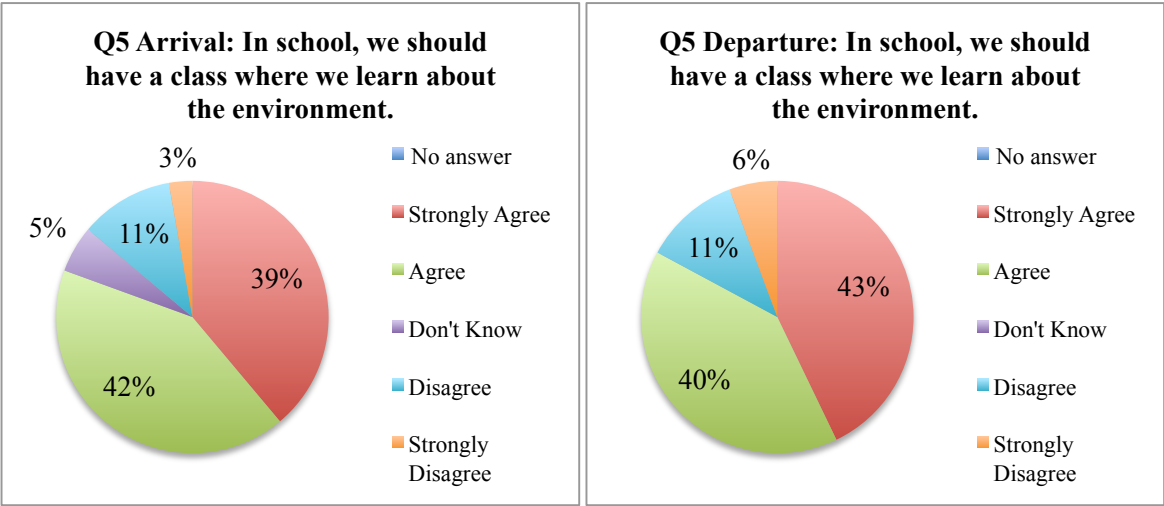


Arrival Mean: 4.06
 Arrival Median: 4
 Arrival Mode: 4
 Arrival Standard Deviation: 0.90

Departure Mean: 4.26
 Departure Median: 5
 Departure Mode: 4
 Departure Standard Deviation: 0.92

The percentage of Upper Primary students who “disagree” or “strongly disagree” that they should be able to use as much water as they want at home increased from 82% to 90%. The “strongly disagree” category increased by 15% which is a marked change from the arrival survey and indicates positive changes in environmental thinking.

Figure 5a: Cambridge Primary Question 5

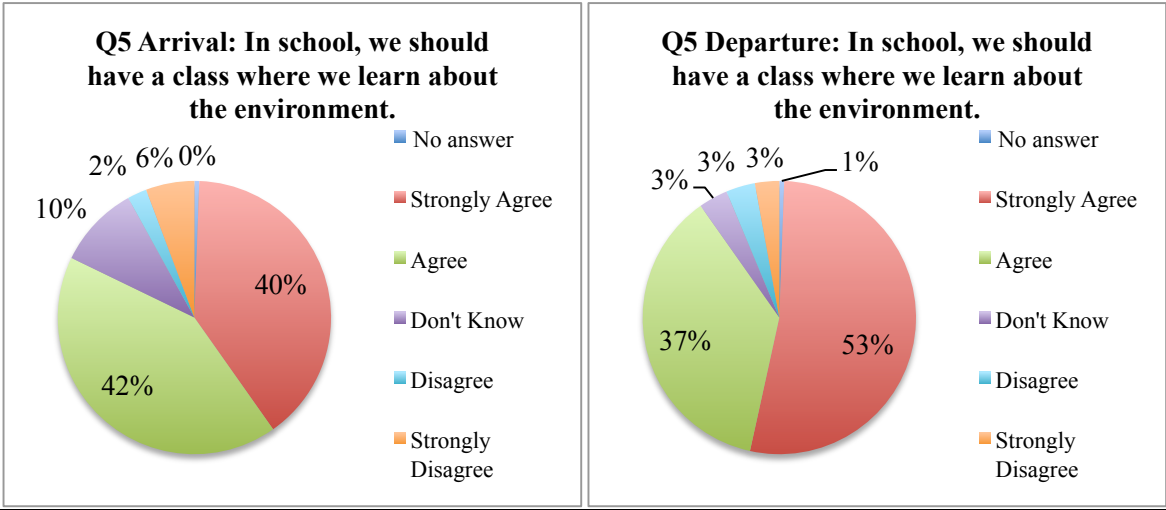


Arrival Mean: 4.03
 Arrival Median: 4
 Arrival Mode: 4
 Arrival Standard Deviation: 1.08

Departure Mean: 4.03
 Departure Median: 5
 Departure Mode: 4
 Departure Standard Deviation: 1.20

The responses to question five generally stayed the same throughout the week and there was not much change between the arrival and departure survey as agreement increased from 81% to 83%. It is important to note that all students answered the question and no students selected “don’t know” at the end of the program.

Figure 5b: Upper Primary Question 5



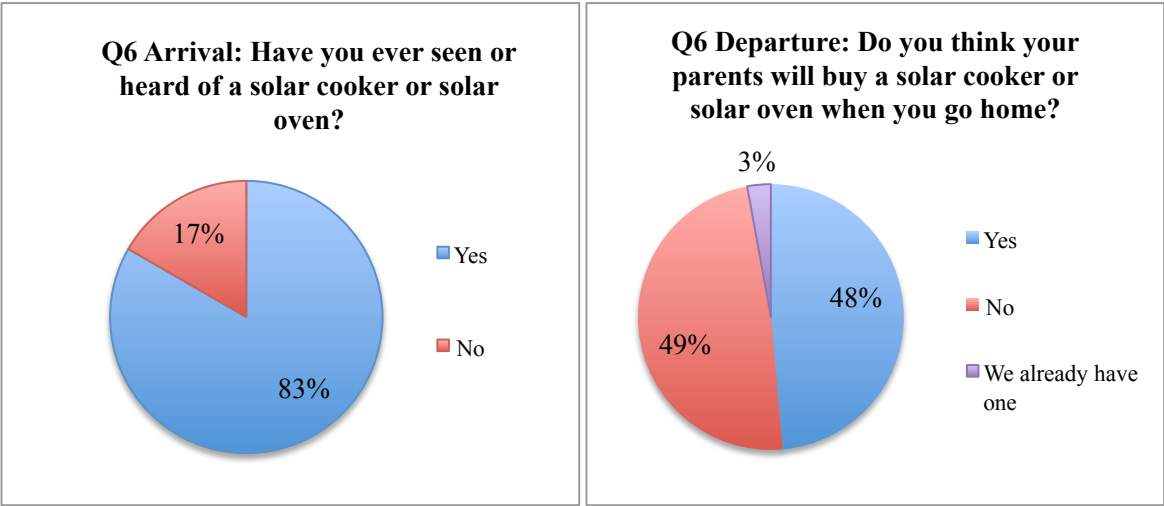
Arrival Mean: 4.08
 Arrival Median: 4
 Arrival Mode: 4
 Arrival Standard Deviation: 1.05

Departure Mean: 4.34
 Departure Median: 5
 Departure Mode: 5
 Departure Standard Deviation: 0.92

The amount of Upper Primary students who “agree” and “strongly agree” that they should have a course at school that focuses on the environment, increased after the weeklong program, from 82% combined to 90%.

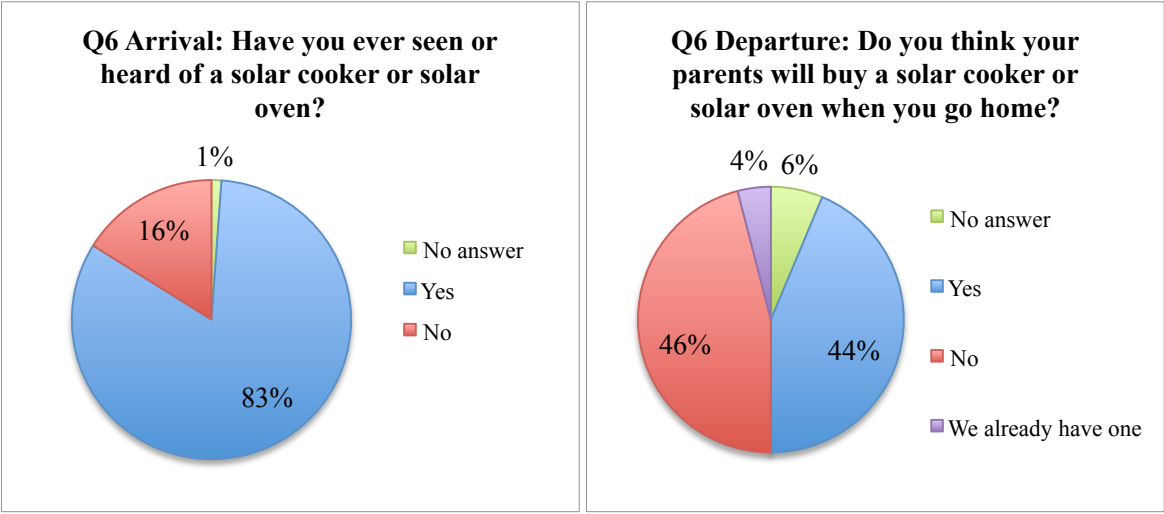
The following questions (6-10) were used to quantify and determine how many students had heard of different topics central to NaDEET’s Upper Primary program before the weeklong EE program, and to determine the probability of environmental action after the program.

Figure 6a: Cambridge Primary Question 6



At the beginning of the week, many of the Cambridge students said they had heard of a solar cooker or solar oven and by the end of the week, it was almost evenly split between whether or not students believed their parents would buy a solar cooker or solar oven.

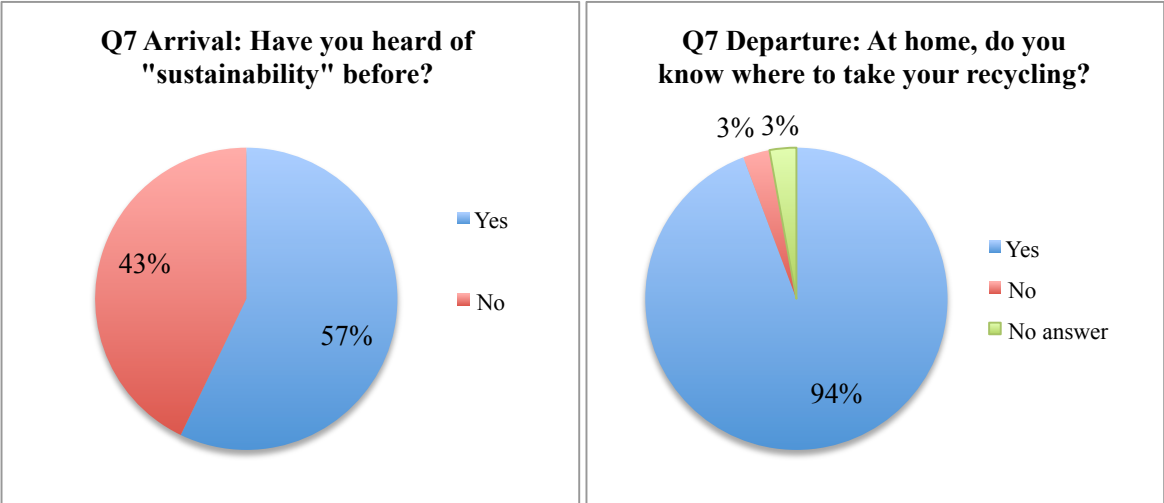
Figure 6b: Upper Primary Question 6



Almost the exact same number of Upper Primary and Cambridge students had heard of a solar cooker and solar oven before their visit to NaDEET. 4% of the Upper Primary students said they

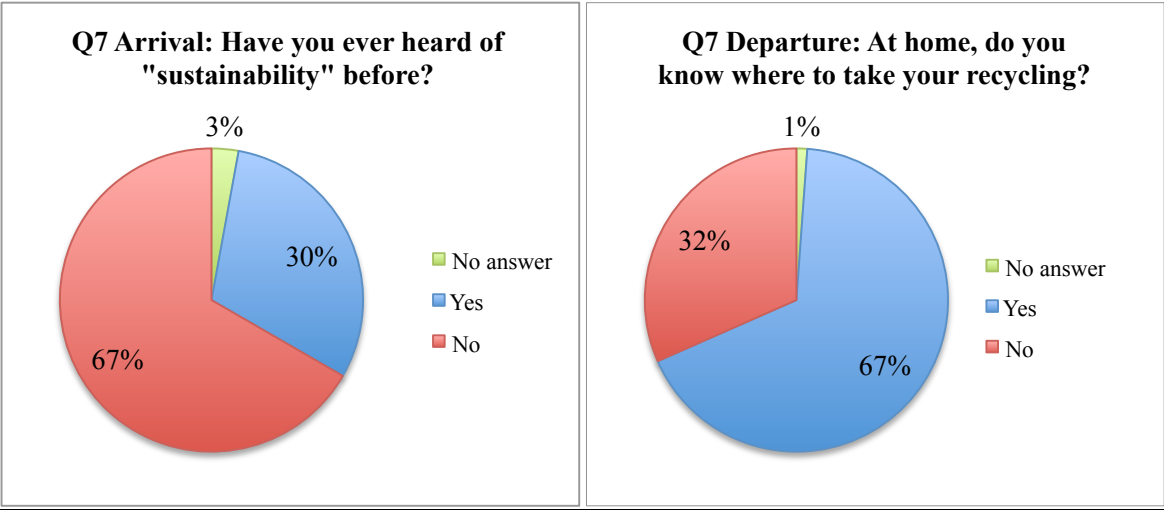
already had a solar cooker or oven. However, less Upper Primary students said they thought their parents would buy a solar cooker or oven when they went home than Cambridge students.

Figure 7a: Cambridge Primary Question 7



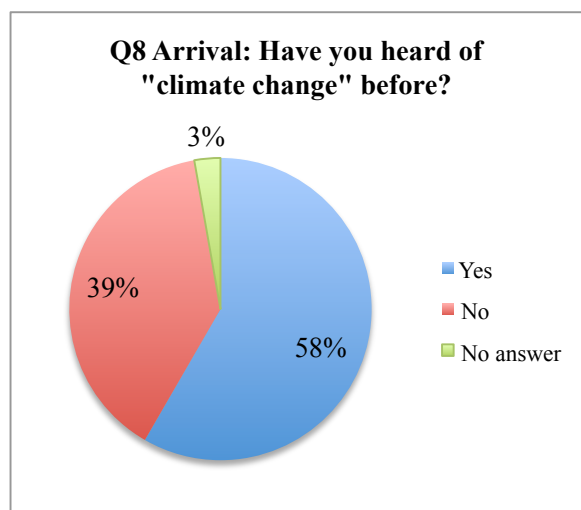
Most Cambridge students said that they had heard of sustainability when they arrived at NaDEET Center. When students left the Center, the majority also stated that they knew where to take their recycling.

Figure 7b: Upper Primary Question 7



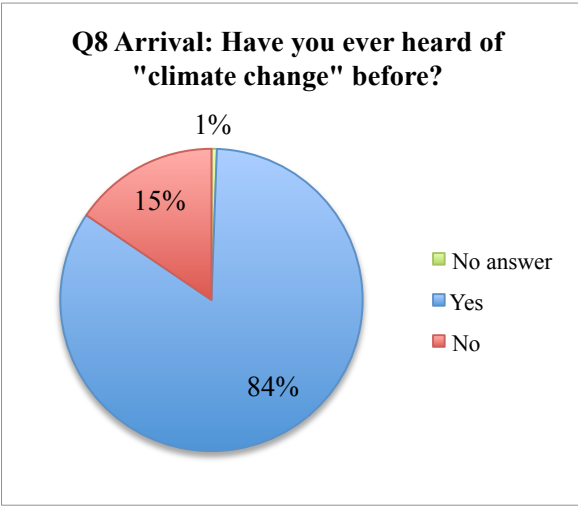
Two-thirds of the Upper Primary students said they had not heard of sustainability on their arrival survey, and a large majority said they did know where to take their recycling by the end of the week. It is noteworthy that more Cambridge students (57%) than Upper Primary students (30%) said they had heard of sustainability, which could mean that the Cambridge students did not understand the question or did not accurately answer it.

Figure 8a: Cambridge Primary Question 8



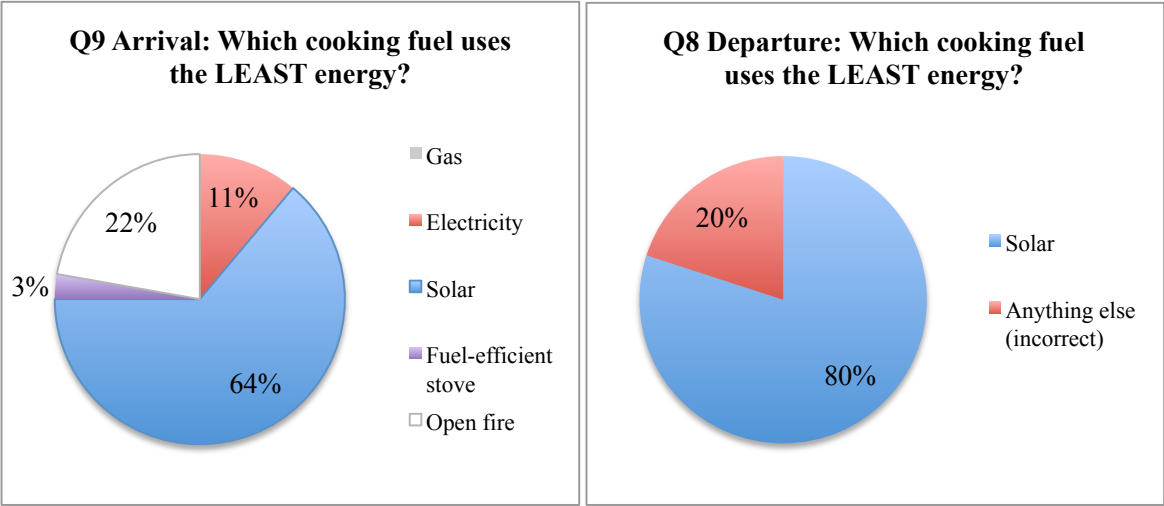
Question 8 was not asked to students on the departure survey. Upon arrival, 58% of Cambridge students said they had heard of climate change. As with question 7, it is possible that Cambridge students answered “yes” but did not actually know what was being asked. Although almost 60% of students said they had heard of climate change, almost no students could actually state what it was or where they had heard the term (as with sustainability).

Figure 8b: Upper Primary Question 8:



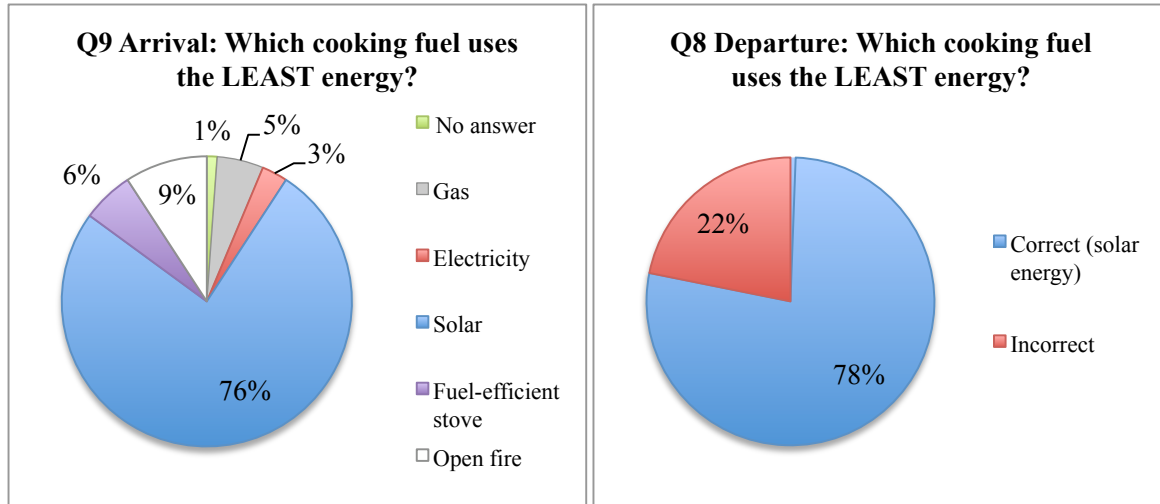
84% of Upper Primary students said they had heard of climate change. This seems more likely as these students came from larger towns and almost all had some form of access to the Internet, newspapers and televisions (although this doesn't mean they know what it is).

Figure 9a: Cambridge Primary Question 9(8)



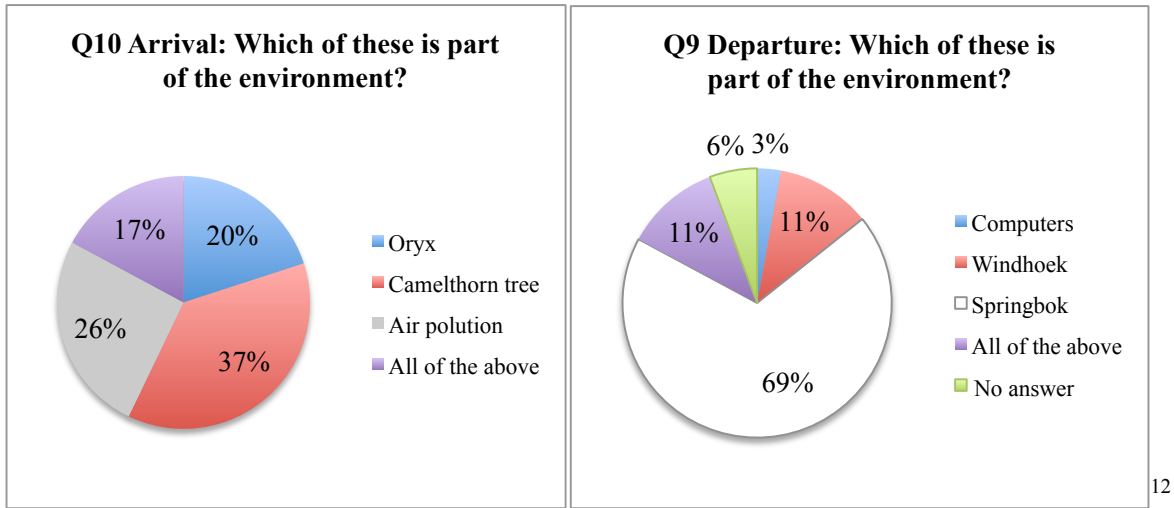
After the week, the amount of Cambridge students who answered this question correctly increased. It is important to note that after the week, however, that 1/5 of Cambridge students still did not answer it correctly.

Figure 9b: Upper Primary Question 9(8)



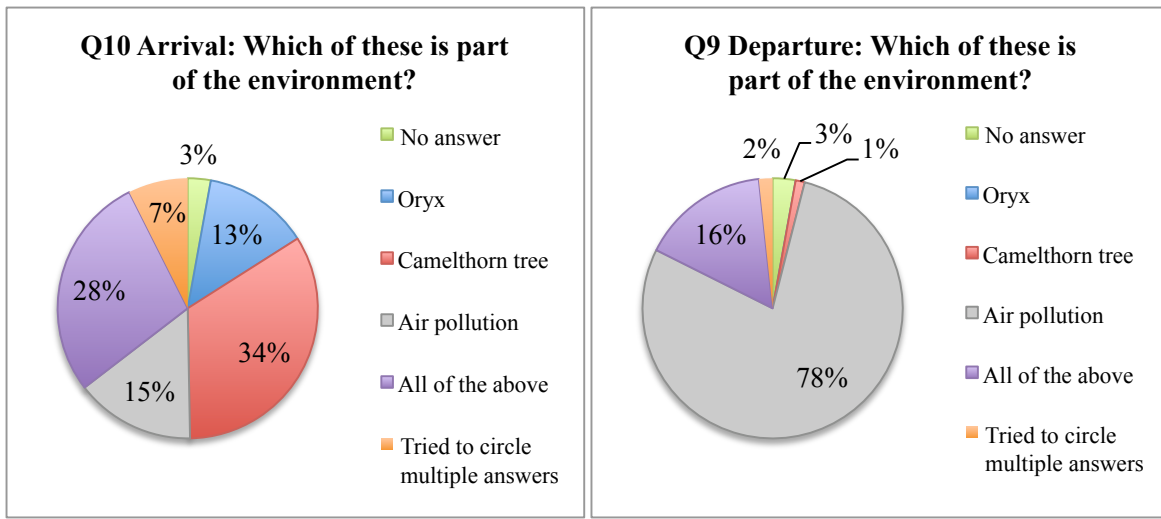
Although more students answered it correctly after the week than upon arrival, there are still 22% of Upper Primary students who did not answer solar energy. There are a few possible explanations for why Cambridge Primary and the Upper Primary students had similar results. Perhaps students did not understand the environmental footprint activity, the energy usage calculations and that the sun is the source of energy for solar cookers and solar ovens. Another very likely cause is that the question admittedly, was worded poorly, and students did not write solar because it is not a “cooking fuel.”

Figure 10a: Cambridge Primary Question 10(9)



In the arrival survey results for Cambridge Primary, the answers for question 10 were spread out between all 5 answers. By the end of the week, most students (69%) believed that springbok were part of the environment and that Windhoek and computers were not included.

Figure 10b: Upper Primary Question 10(9)



¹² Question 9 on the departure survey for Cambridge Primary was slightly different than Question 9 for the Upper Primary students. After Cambridge took the survey, it was decided that the question should remain the same to see how the answers differ throughout the week.

Upper Primary students also incorrectly answered this question, with the majority only stating “air pollution” as part of the environment. This could mean that students did not understand the foundational lesson that the environment is made up of living, non-living and human-made things. Again, admittedly, this question was poorly worded and could have been confusing to students.

Survey Conclusions

The results of the survey, when compared to one another, show that Cambridge Primary students did not absorb NaDEET’s lessons as much as the Upper Primary students did during their visit to NaDEET Center. This is most likely due to language and literacy issues. The following table of means illustrates how attitudes changed during the week for both groups. A higher mean in the post survey compared with the arrival survey would indicate the development of a more positive attitude toward the environment after the NaDEET program.

Table 2: Table of Means - Comparing Cambridge and Upper Primary Students

	Cambridge Primary (36 students)		Upper Primary (174 students)	
	Pre	Post	Pre	Post
Q1	2.47 (1.19)	3.11 (1.30)	3.43 (1.33)	4.03 (1.09)
Q2	3.39 (1.27)	3.38 (1.28)	3.88 (0.93)	4.15 (0.95)
Q3**	3.69 (1.43)	3.49 (1.40)	4.49 (0.82)	4.59 (0.80)
Q4	2.91 (1.50)	3.29 (1.32)	4.06 (0.90)	4.26 (0.92)
Q5**	4.03 (1.08)	4.03 (1.20)	4.08 (1.05)	4.34 (0.92)

Note: The Likert scale used to calculate the means for questions 1, 2, and 4 is as follows: 1 = Strongly Agree, 2 = Agree, 3 = Don't Know, 4 = Disagree, 5 = Strongly Disagree.

**Questions 3 and 5 have been reverse coded so that the Likert scale is: 1 = Strongly Disagree, 2 = Disagree, 3 = Don't Know, 4 = Agree, 5 = Strongly Agree. This is to ensure that a higher mean always

equals a more positive attitude toward the environment. The standard deviations can be found in parentheses next to the mean for the post and pre tests.

While the Upper Primary students' attitudes positively increased for every question, the Cambridge Primary students' responses decreased (as with Questions 2 and 3) and stayed the same for question 5. While acknowledging the flaws in the survey, and using it solely as a general measure of student understanding of NaDEET material, one can conclude that Cambridge Primary students did not understand most of the material regarding water consumption, natural resources, recycling, and energy as their attitudes on these issues did not positively change after the program. Because NaDEET specifically focuses on these areas (water, biodiversity, waste and energy), it is crucial that a separate ELL program is designed so that all students have an equal opportunity to learn about the environment and environmental issues.

Chapter 7: Literature Review

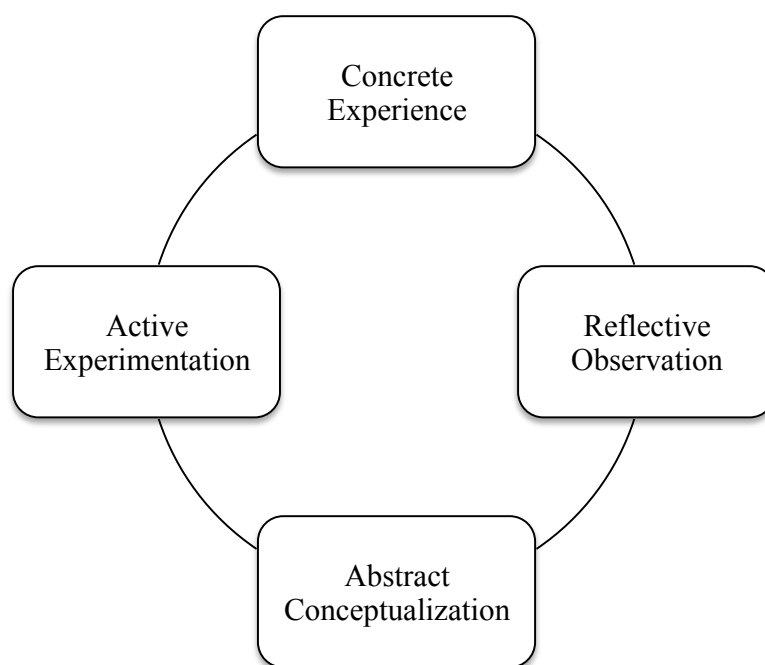
Experiential Environmental Education

As mentioned in the previous section on environmental education, one of the main goals of environmental education is for the learning to be experiential. Most of the learning takes places outside the classroom, and is learner-centered. Experiential learning has its roots with the “pragmatism of Dewey, the Gestalt and action research perspectives of Kurt Lewin, and Jean Piaget’s structural dimensions of cognitive development” as it asserts that there are multiple ways of knowing and that there are alternatives to traditional approaches to education (Sims and Sims 1995: 131). Experiential education proponents argue that learning does not happen solely through books or lessons given by a teacher, but rather through the experience of the learner (Sims and Sims 1995: 130). As Heimlich and Daudi explain,

“A strength of environmental education is that it often engages the learner through exploration, examination, gaming, discovery, and hands-on activities. The nature of environmental education is such that these activities both draw the learner into the learning exchange and also become the basis of the learning that is to follow” (2002: 27).

While experiential learning is based on engaging the students through a variety of activities, it is crucial that follow-up discussions and activities occur to enhance learning. David Kolb proposes that in order to have experiential learning, students must work through four learning modes: 1) concrete experience, 2) reflective observation, 3) abstract conceptualization, and 4) active experimentation (cited in Brooks-Harris & Stock 1999: 9).

Figure 11: Kolb's Experiential Learning Cycle



Heimlich and Daudi point out that in order to reach Kolb's four learning modes, educators should follow these five steps when designing experiential activities: 1) create the opportunity, 2) involve the learner in an experience, 3) process (discuss) the experience, 4) generalize the experience to other situations, and 5) apply the knowledge (2002: 28). These steps are crucial in developing an experiential curriculum and in reaching environmental education's goals.

Teaching English Language Learners

The Lower Primary curriculum for NaDEET is experiential and designed to teach English Language Learners (ELLs). Fortunately, due to the constructivist nature of environmental education and the fact that it is most often taught through hands-on activities, it is a well-suited educational approach for teaching ELLs (Heimlich et al. 2002: 81). Heimlich et al. offers advice

on how to make the curriculum accessible to ELLs. First, educators should use a variety of approaches when addressing students in English, including utilization of aids, such as hand gestures, drawings, and nonverbal cues (Heimlich et al. 2002: 83-84; Bowe 2000: 76-78). Physical and affective engagement is also important in making the lesson experiential for ELLs and is a major component of NaDEET's curriculum (Heimlich et al. 2002: 80-81).

Educators need to be aware of their audience's language capabilities and avoid dividing the lessons into too many parts so as to not lose the whole point of the lesson (Sims and Sims 1995: 72). Furthermore, listening and speaking activities should take place before any reading and writing activities and the educator should regularly check for student understanding of concepts and be prepared to re-teach lessons when necessary (Heimlich et al. 2002: 84-85). Asking students questions and promoting active listening and teacher-student interaction when in the classroom are crucial when teaching ELLs. Speaking slowly and repeating important vocabulary will also be important. The following points addressed by Heimlich et al. will be especially useful in designing NaDEET's Lower Primary ELL curriculum:

1. *Encourage Active Language Production:* Educators should utilize both native-language groups (when reviewing a lesson and incorporating cultural knowledge) and mixed-language groups (while constructing knowledge and introducing new ideas). For example, to introduce a new lesson, the educator should use visual aids and concrete objects to aid students in English language lessons. However, when students are reviewing a lesson or concept they should work in native-language groups so that students with strong English skills that comprehend the material in English can help weaker students (2002: 85-86).
2. *Draw on Prior Knowledge:* It is important to use themes that make the lessons applicable to students' lives and draw on their prior knowledge of different subjects. This is essential to reaching NaDEET's goal of teaching students about how sustainable living and alternative energy technologies can improve the quality of

students' lives by comparing prior behaviors (i.e. using open fires) with more sustainable ones (i.e. fuel-efficient stoves) (2002: 85).

3. *Provide Primary Language Support*: The teachers who accompany students to the center should be used a resource to provide language support to students when needed. They should also be involved in pre- and post-trip lessons that reinforce concepts, ideas and behaviors students learn at NaDEET Center (2002: 47, 85). Bowe echoes Heimlich et al. by pointing out that “the availability of instructional materials in different languages is an important concern” as well (2000: 16).

Universal Design

It is possible to apply the principles of Universal Design when teaching, or creating a curriculum for, ELLs. Although Universal Design usually refers to creating physical spaces, which are accessible to handicapped people, it can be adapted in NaDEET's case to mean creating a learning environment that is accessible to ELLs and allows them equal access to environmental education. As Bowe quotes the Council for Exceptional Children, Universal Design of education is,

“The design of instructional materials and activities that makes the learning goals achievable by individuals with wide differences in their abilities to speak...read, write, understand English...Universal design for learning is achieved by means of flexible curricular materials and activities that provide alternatives for students with differing abilities. These alternatives are built into the instructional design and operating systems of educational materials –they are not added on, after-the-fact” (2000: 45).

In the past, the Upper Primary program at NaDEET has been “watered down,” added to and/or slightly modified for ELL groups. This was due to a lack of staff, time and resources to develop a Lower Primary program. Therefore, it was decided that it was necessary to create a separate

program so that ELL students could partake in a program that was designed for them and not constantly adapted when ELL groups booked the education center.

Understanding Diverse Learning Styles

When looking at the existing frameworks for determining students' varying learning styles, often students of color and students lacking in English language skills, are left out. These students learn best in an environment that is suited to their learning style and catered to their personal needs (Sims and Sims 1995: 69). For example, in the existing learning style model, there is no mention of differences in race, gender, cultural background and socioeconomic status. Many scholars suggest that these factors need to be taken into account in order to understand differing learning styles (Sims and Sims 1995: 70). Furthermore, in designing a curriculum for ELLs in Namibia, these characteristics seem especially important to consider.

Bowe explains that one of the first steps an educator can do when teaching a diverse group of students is to question his/her own perceptions and acknowledge that they are not necessarily right or "normal" (2000: 18). Educators should also ask questions about their students, for example: "What cognitive, affective, and cultural assets do diverse students bring to learning environments, and how do such assets facilitate or inhibit their performance?" (Sims and Sims 1995: 73). What is the learner's prior knowledge? How can this be used or incorporated into lessons at NaDEET? Once these questions have been answered, the educator can seek to create a universally designed curriculum for ELLs.

Chapter 8: Designing the EE Curriculum Based on UD Principles

Identify Goals

In order to create an environmental education curriculum, I have looked to the steps described by Hungerford and Peyton. Although Hungerford and Peyton are more concerned with creating a formal EE curriculum for a school or school district, the steps can be modified to fit the needs of the NaDEET Lower Primary curriculum (Volk 1997: 52).

First, they recommend identifying goals for the curriculum. In order to create goals for the NaDEET curriculum, I have used the universally accepted goals, “considered to represent a consensus of what authorities in environmental education believe to be the goals of the field,” and adapted them so that they are specific to NaDEET and the students involved in the Lower Primary program (Volk 1997: 53). The following are the four main goals of EE as stated by Hungerford and Peyton:

1. “Ecological Foundations Level: This level seeks to provide learners with sufficient ecological knowledge to permit them to eventually make ecologically sound decisions with respect to environmental issues.”
2. “Conceptual Awareness Level, issues and values: This level seeks to guide the development of a conceptual awareness of how individual collective actions may influence the relationship between quality of life and the quality of the environment and, also, how these actions result in environmental issues which must be resolved through investigation, evaluation, values clarification, decision making, and finally, citizenship action.”
3. “Investigation and Evaluation Level: This level provides for the development of the knowledge and skills necessary to permit learners to investigate environmental issues and evaluate alternative solutions for solving these issues.”
4. “Action Skill Level, training and application: This level seeks to guide the development of those skills necessary for receivers to take positive environmental action for the purpose of achieving and/or maintaining a dynamic equilibrium between quality of life and the quality of the environment.” (50-51)

Using the above four points as the over-arching goals for the NaDEET program, I have also created the following sub-goals for each category so that it is applicable to the Lower Primary program.

Table 3: Outline of Sub-Goals of NaDEET Lower Primary Program for ELLs

Hungerford et al. Goal	Adapted Goal for NaDEET	Sub-Goals
Ecological Foundations Level	Build a Scientific and Ecological Foundation	Learn: <ul style="list-style-type: none"> ○ What makes up the environment ○ How humans affect the environment ○ How animals adapt ○ How alternative energy sources and technologies work
Conceptual Awareness Level	How Behavior Affects the Environment and Quality of Life	Learn: <ul style="list-style-type: none"> ○ How behaviors negatively affect environment and name environmental issues ○ How alternative energy/technologies can save money ○ How sustainability improves quality of life
Investigation and Evaluation Level	Finding Solutions and Alternatives	Learn: <ul style="list-style-type: none"> ○ How to investigate a species ○ How to conserve resources ○ How to make positive environmental choices
Action Skill Level	Positive Environmental Action	Learn: <ul style="list-style-type: none"> ○ How to modify behavior ○ How to share lessons with others ○ Dangers of not caring for the environment

Determine Scope and Sequence

These sub-goals were created after looking at the scope and sequence of the curriculum, step two of Hungerford and Peyton’s process. Scope refers to the amount of focus placed on

certain concepts and ideas in the curriculum while sequence refers to the ordering of lessons so that they build on each other (Volk 1997: 53-56). In this case, the scope is directly related to the mission of NaDEET and the skills and lessons the organization hopes to accomplish with each goal. The sequence follows the same pattern as the goals and starts with building a basic foundation of knowledge on the environment and environmental issues and builds up to environmental action. As Volk reminds us, sequence is key in NaDEET's environmental education curriculum as elementary concepts about ecology must be understood before students can discuss environmental problems and solutions (1997: 55). The focus for younger elementary students will be on creating an ecological foundation and will increase in complexity as students become older. Since the ELLs in NaDEET's Lower Primary program are between grades 5 and 7, Volk would argue that the lessons at NaDEET should be a combination of the major EE emphases for grades 3-6 and 6-9. This means that students will not only gain an ecological foundation, but also begin to discuss environmental issues, investigate on their own, and begin developing their action skills (Volk 1997: 63).

Evaluate Existing Curriculum and Inventory Resources

Once the scope and sequence have been determined, and the goals and sub-goals have been set, the next step is to evaluate the existing curriculum and inventory resources available at NaDEET Center. As mentioned earlier, the existing curriculum for Upper Primary program participants shows a favorable change in attitude toward the environment after the weeklong program and is generally considered successful. However, modifying this program for ELLs shows mixed results. There are aspects of the Upper Primary program that are included in the Lower Primary program and some activities from the Upper program are relevant and useful in

the Lower program. Three ideas from the Upper Primary program – the 3Rs, solar cooking, and biodiversity – are present in the Lower Primary program as they are standard activities at NaDEET Center. This means that Lower Primary program participants will continue to make recycled fire bricks, solar cook their meals, set traps and go on a biodiversity dune walk to observe and learn about the plants and animals of the Namib Desert. All participants at the Center also monitor their environmental footprint of the week by recording water usage, waste generated, and energy used. This activity, called “Measuring Our Enviro Footprint,” is also be part of the Lower Primary program, but has been adapted so that it is understandable for ELLs.

Below, I have compiled an inventory of the available educational resources currently at NaDEET Center. This list serves as a reminder when creating activities, so that as many existing resources as possible are used, and the financial costs of adding new resources is limited. NaDEET Centre’s infrastructure is a resource in itself as it serves as a model of sustainable living and thrives on the philosophy of “practice what you teach.” The table below outlines the resources available at NaDEET Center, including the infrastructural features that provide for informal learning opportunities.

Table 4: Educational Resources at NaDEET Center

Infrastructure	
Bathrooms Made of Recycled/Re-used Materials with Water Tank Monitors	Bathrooms provide an example of recycling and reusing materials in a practical and cost-effective way, while water tanks teach students about monitoring consumption and their daily water usage
Compostable Toilets	Demonstrate how composting toilets are better for the environment, and shows how

	to reduce water by using a no-flush toilet; the Center is installing a UDS (Urine Diversion System) toilet to explain how human waste can be reused as fertilizer and compost
Kitchen	Area where students prepare food to solar cook and also learn about water monitoring and the hot box which keeps food warm for hours after it is cooked
Compost Pile	All biodegradable food waste is composted and this could be used as an educational activity to teach about recycling food scraps
Alternative Energy Technologies	
Solar Panels and Solar Heaters	Shows how the sun can create electricity, and heat water for showers and kitchen through absorption and the greenhouse effect
Solar Cookers and Solar Ovens	Used by students to cook lunch and dinner and bake muffins and located on the solar deck which is adjacent to the classroom
Outdoor Fuel-Efficient Stoves	Used by students to boil water in the morning and learn about how a “closed” stove is more efficient than an open fire
Environment	
Desert Environment	Surrounding NaDEET center are a variety of plants and animals for observation and study, and sand dunes which provide an opportunity for students to have fun outdoors and enjoy the beauty of the desert

Classroom Resources	
Classroom	Tables and chairs for students, and a white board, projector, and speakers to use during classroom lessons
Library	Fiction and non-fiction books, identification guides, dictionaries, magazines, teacher resources
Ecological Artifacts	Droppings, fossils, and other ecological artifacts allow students to get up close to different animals and learn about their adaptations
Bush Telegraphs, NaDEET Activity Book, and Identification Guide	NaDEET publications that are given to students to encourage them to think critically about environmental topics and challenge them to take action
Equipment for Solar Experiments	Four available experiments that can be used to teach students about solar energy and can be adapted for use in Lower Primary program
Art Supplies	Crayons, markers, colored pencils, oil pastels, watercolors, scissors, glue, paper, butcher paper
Posters and Games	Enviro Picture Games, posters from various NGOs
Computer and camera	To develop new resources at low cost easily, and to use for classroom presentations
Recycled Fire Brick Makers	Metal frames that are used to form recycled fire bricks out of newspaper, some water and sawdust

Once the resource inventory has been created, there has been a critical look at the existing curriculum, and the goals, sequence and scope have been determined, it is time to prepare and design the new curriculum.

Chapter 9: Program Presentation

The Lower Primary Program Theme

The current progression of the Upper Primary program works well – beginning with an introduction to the environment and ending with taking environmental action. The Lower Primary program will have a similar, but not identical progression. Instead, it will begin with a focus on prior knowledge, progress to an introduction to the environment, challenges for the environment, and finally, taking responsible environmental action. As suggested by the Director of NaDEET, I have used the Earth Charter as the foundation for the weeklong LPP. The four subtitles in the preamble of the Earth Charter have been modified to be the daily themes for the program. The four original themes as listed in the Earth Charter are:

1. Earth, Our Home
2. The Global Situation
3. The Challenges Ahead
4. Universal Responsibility

The overarching theme for the week is “Connecting Indigenous Knowledge and Environmental Sustainability.” While a volunteer at NaDEET, I noticed that the English Language Learners seemed to know a lot about plants and animals (upon seeing them in person or in pictures) and could identify their uses for medicine, food, and shelter for example. Because of this, the Lower Primary program focuses on bringing the learners’ prior knowledge into the NaDEET curriculum and gives them a comfortable base from which to start the program. There is also a focus on appreciating the environment before jumping into environmental sustainability activities in order to increase the emotional connection to the environment. The goals for the curriculum are: 1) to be applicable and possible to implement, 2) to be learner-centered with a variety of teaching methods, 3) to convey environmental information in an understandable way,

4) help NaDEET reach its goal of successfully providing EE to rural schools in Southern Namibia. Below I have outlined the theme and goals for each day of the program. All of the activities have been designed with ELLs in mind and have been created by me, unless otherwise noted. Some of the activities are footnoted, as they are adapted from their original version in the Upper Primary program.

Daily Themes

Day One:

The first day's theme (borrowed from the Earth Charter) would be slightly modified to become "Earth, Our Home & Our Ancestors." This day focuses on prior knowledge of humans as part of the environment and will be used to talk about what the children already know about nature and their role in it. There will also be a focus on oral traditions and stories that students (hopefully) know or are familiar with. By using these stories, the students are able to build on their existing ideas about nature and bring their unique cultural traditions into the classroom. The first day will also be used to make the students feel comfortable in an unfamiliar setting.

Day Two:

Day Two uses a theme that is not explicitly written in the 4 points listed in preamble of the Earth Charter. Nonetheless, it is essential to the program as it focuses on "Exploring and Appreciating Nature." After the first day, students have gone over what they already know about the environment and on the second day they will now expand on what they know through exploring on their own and as a class. This day is supposed to be an exciting and fun introduction to the environment and all of the activities are designed to be outdoors (assuming appropriate weather conditions exist). The purpose of Day Two is to increase students' appreciation for the

intrinsic value of the natural environment so that they have an emotional reason to want to protect it.

Day Three:

Day Three combines points 2 and 3 of the Earth Charter to become “The Global Situation: Challenges for the Community.” On day three, there is a focus on sharing resources and leaving some for future generations. In particular, students will look at collecting firewood for use as a fuel source, wasting water, and overconsumption of resources, as these are pressing issues in Namibia. The third day would also look at the negative interactions between humans and their environment and would provide a balance to days one and two, which focus more on appreciating nature. In other words, day three will be used to show what happens when students do not appreciate and respect their environment. This would be linked further to include respecting one another and the evening activity will focus on treating others with respect.

Day Four:

Day Four would be the final theme listed in the Earth Charter and adapted from “Universal Responsibility” to “Individual and Collective Responsibility.” Most ELL students come from rural communities and it is necessary to not only take individual responsibility, but also to work as a community to solve problems. The fourth day is dedicated to students taking action for the environment and includes a series of hands-on activities. These activities aim to induce creativity and teach students practical skills that will allow them to positively change their behavior towards the environment. For example, the students will make recycled firebricks out of newspaper as an alternative to using firewood to cook. The fourth day ties together the weekly activities and solidifies the message that NaDEET has taught throughout the week. Students will

also look at their environmental footprint on the last day to observe how it has changed since the first day.

Daily Activities

Day One:

Students will arrive at NaDEET Center in the early afternoon and will be introduced to their accommodations, showers, bathrooms and sustainable living teams (small groups of same-sex students who will share these facilities and will measure their houses' water usage) for the week. After students have settled in, they will come to the classroom and have an activity where they introduce themselves to other students and NaDEET staff. They will then be assigned a table inside the classroom, which will form their classroom teams, groups of 5-6 students who will work on activities together. Once students are in their classroom teams, they will be given a journal that they will fill in throughout the week. This journal will be specially designed for Lower Primary program students and will have a larger focus on drawing and pasting in pictures, rather than writing and reading.

Belonging to Nature

Aim: To show students that the environment consists of living, non-living and human-made things, and to introduce the topic for the week.

Description: This is the first educational activity at NaDEET Center and will teach students that the environment is interconnected and it not separate from humans. Students will be able to see their pictures of “the environment” throughout the week as a reminder that they are part of the nature.

Directions:

1. All students should draw the environment in groups (making sure they have all the parts, including humans and human-made things) or use photos and put them in “the environment” (either in groups or as a class). This could be done with a magnetic board

that has a big circle, divided into 3 parts (living, non-living and human-made) and the kids would put all parts of the environment into the appropriate part of the circle. Each student would have a picture (a human, an animal, the sun, a car, etc.) and would have to decide whether it is part of the environment or not. When they finish they will all make a drawing with these things in a circle or put them together as a class on a board to serve as a reminder throughout the week.

2. Students will fill-in the first part of their activity log.
 - a. There are two variations:
 - i. The students will Velcro a piece of a large Earth puzzle that has a picture of the activity they just finished – a circle with the environment divided into 3 parts - into the proper place. The puzzle will serve to show what the students have learned about and will be filled in after each activity.
 - ii. The activity log involves students securing a piece of a large tree made out of wood or paper-mâché. The tree would show how much students are learning about the environment and will “grow” throughout the week. For example, the first activity would show the foundation of the tree being put into place and would be tree roots. After each activity the students will add a part to the tree in order to signify what they’ve learned. At the end of the week, the tree can be used to show students’ commitment to environmental protection and conservation by having them tie a string to a branch, or hanging an ornament they’ve made out of recycled materials.

Leaning on the Earth

Aim: To illustrate the dependence that humans have on the environment and how resources can be and are used. Another aim is to bring in indigenous knowledge and see if the students already know of or can come up with other uses for plant and animal resources.

Description: This is a game where students will match up plant and animal species pictures to the needs they provide for humans.

Directions: There are two variations of this activity which are described below:

1. For this activity, every student gets one picture of one of three things: 1) plant or animal, 2) the part of the plant or animal that humans use, 3) the way that humans use that plant

or animal. These three pictures will go together to form a sequential match. Before the activity begins, the educator will explain through pictures how the activity works. They will use a simple example starting with an oryx. The next picture will be of meat and the last picture will be of people eating dinner. Two arrows will connect all three photos to show the relationship. All students will then walk around the classroom to find their 2 matches. When they have finished they will hang them up in the correct order on the board (or poster that is designed for this activity). Once all students have found their correct matches, the students will cut out smaller copies of the same pictures and glue them into their journals in the spaces provided. The journal page will have rows of three squares that are connected by two arrows to show the progression from plant or animal to human use of that plant or animal. The journal will also have some space for the students to make up their own examples.

2. This could be a game where students have a board and make the matches as a team. Once the students make the matches then they would cut out the smaller photos and glue them into their journals in the correct order. Students would then try to make up 2 more examples and would share those with the class by drawing them out and hanging them onto the board.
3. Students will complete the activity log and fill-in the piece that corresponds to the “Leaning on the Earth” activity.

NaDEET Slideshow

Aim: To introduce learners to NaDEET and the variety of animals that live on NamibRand Nature Reserve.

Description: Most visiting students have traveled a far distance to reach NaDEET and are unfamiliar with the NamibRand Nature Reserve and the animals that live in this area. In the evening students will come to the classroom for a slideshow introduction to NaDEET.

Directions:

1. A brief introduction to NaDEET will be given, followed by a slideshow that shows the different types of animals that live on NamibRand Nature Reserve and especially those that the students are not likely to see (cheetah, zebra, giraffe, leopard). Many students do not know what animals live in Namibia and are amazed at the variety that is located on

NamibRand. This introduction also gives students an idea of what NaDEET does and what the weeklong program holds in store for them.

Day Two:

All of the activities for Day Two are meant to inspire an appreciation of nature. Students will do most (if not all) of the activities outside and will be encouraged to explore on their own and in groups. As mentioned earlier, the point of Day Two is to create an emotional connection to the natural environment.

Scientists in-Training

Aim: To have students come into contact with plants and animals and to be able to take a closer look at fossils, bones and ecological artifacts.

Description: Students will be “Scientists in-Training” and will use microscopes and dissection tools to look at a variety of ecological artifacts at different stations.

Directions:

1. There will be four different labs set-up outside and one in the classroom, each with a different focus. The first table will look at fossils and rocks, the second will look at the ecological artifacts in the glass display case in the classroom, the third table will look at the sun, and the fourth table will be a dissection and exploration table. Each table will correspond to a different activity page in the journal.
1. Each station will have the following activities:
 - a. The ecological artifacts station will have a matching activity where students draw a line to connect two pictures together (i.e. an oryx and its droppings). Note: This activity can be used as preparation for the dune walk as students become familiar with droppings and the animals found in the Namib and can point out what they see during the walk.
 - b. The dissection and exploration table will look at Camelthorn tree seedpods, various animal droppings, and parts of different plants. Students will dissect and use magnifying glasses to get a closer look.

- c. The fossils and rocks table will also look at the sand from the Namib Desert. At this table, students will make their own fossils using a simple dough mixture.
 - d. At the sun table, students will burn paper with the magnifying glasses and learn about the power that the sun possesses by looking at absorption and reflection. They will make a hypothesis and test it using two of the Power of the Sun experiments.
2. After each station, students will record their observations or complete the corresponding activity in their journal.
 3. Again, they will go into the classroom and complete the daily activity log and build the learning “tree.”

Powered By the Sun

Aim: To explain to students how they will solar cook and to introduce them to the solar cookers, solar ovens, and the hot box.

Description: To teach students how to solar cook and how the sun powers the solar cookers and solar ovens.

Directions:

1. Have students play a game of tag, or race to a certain spot, making sure that most of the students are running.
2. After a few minutes, ask students if they are hot and/or tired. If so, explain the connection between feeling hot and tired and using energy. If not, ask if they would be hot or tired if they continued the game and why. Ask students where we get our energy to run. Where do cars get energy to move? Where do plants get their energy? (Earth Day Canada “Energy Lesson 1”: 2010)
3. Ask students to guess where solar cookers and solar ovens get their energy. Have them put their hand out and explain that the warmth they feel is heat energy from the sun. Use the solar hat and mini solar panel to demonstrate how it will take for the sun to provide enough energy so that the fans turn on.
4. Next, walk the students to the solar ovens and solar cookers and show them how they work. Have students test out how hot both of these pieces of equipment can get from the sun alone. The students will then be introduced to the hot box and how it works in simple

terms.

5. Go back into the classroom and have the students draw pictures of the solar cookers and solar ovens in their journals and then paste in pictures of how the sun powers the cookers and ovens (a basic outline will be provided in the journal and students will fill in the spaces with the pictures). For example, the cycle will involve students drawing the solar oven and solar cooker and gluing in the following: the sun, arrows that show energy transferring from the solar cooker/oven to the pots/pan, to a picture of a hot dish coming out of the hot box, to a pot/pan on a table with people sitting around to eat.
6. Note: When a house team is cooking they will use the solar cookbook section at the back of the journal where students will draw (or write) ingredients that they are using, what device they used to cook the food, and how long it took to cook the meal.
7. Log the activity.

The Namib's Secrets

Aim: To have kids explore the Namib Desert and take notice of their surrounding environment.

Description: This is a game where students find clues and pictures, which lead them to different parts of NaDEET Center and the valley.

Directions:

1. Two Variations:
 - a. Each classroom group would be given a “treasure” and then would make a map for another group to find it somewhere in the NaDEET Valley. The map would have to be detailed and include different natural landmarks and cardinal directions.
 - a. Students will go on a scavenger hunt to find different parts of NaDEET Center and NaDEET Valley. They will start with a clue, either a simple sentence or a picture that will lead them to the next clue. Once they get to the subsequent clue, they will either need to draw it or collect something from that place (i.e. a card or an object). Each team will have a slightly different scavenger hunt (or the same scavenger hunt in a different order). The first team to come back to the classroom with their journals filled in and with all the objects wins.
2. Attach the piece that corresponds in the activity log.

Environment as Art¹³

Aim: To promote creativity, resourcefulness and self-confidence in learners through art. To promote an appreciation of nature and have learners play outside and intimately with their environment.

Description: Learners are asked to create their own piece of artwork using only items found in the environment including twigs, leaves, grasses, and feathers.

Directions:

1. Divide the class into smaller groups. Preferably no more than 20 learners per group. NaDEET staff members will conduct the activity independently with their group. Take each group of learners to a shady spot where they can all fit comfortably and have their own space in a dune valley next to NaDEET Centre. The groups should not be able to see each other if possible. Explain that students will be making art out of the natural environment.
2. The learners should individually (or in small groups) choose a place to create their own piece of artwork. They are to only use items from nature. Remind the children not to uproot living plants, but that they can build something around a living thing, like a tree, if they'd like.
3. When they are finished, have some of the learners share their artwork and discuss as a group what they have all made (if they are comfortable with sharing).
4. Make links to the rest of the NaDEET programme that is appropriate for their artwork. Leave the artwork for the rest of the week so they can add to it if they so choose.
5. Log the activity.

Biodiversity Dune Walk¹⁴

Aim: To investigate the biodiversity of the Namib Desert and to allow students to identify species on their own. To allow students to record what species they saw during the walk.

¹³ Activity adapted and edited from NaDEET's *Upper Primary School Programme Lesson Plan Guide*, page 19, which I helped revise during my internship at NaDEET.

¹⁴ *Ibid.*, page 20.

Description: NaDEET staff will lead learners on a 2.5 hour walk through the dunes. Different plant and animal species will be pointed out along the way. The walk provides an opportunity for learners to explore the area around NaDEET Centre and to see more of NamibRand Nature Reserve. It also gives them an opportunity to identify on their own and use what they have learned in “Scientists in-Training.”

Directions:

1. Divide the learners and teachers into two to three groups, making them as even in numbers as possible. Start the walk by looking for tracks on the dunes surrounding the Centre.
2. Make the walk interactive and ask learners questions about the plants and animals that you see. When a species is spotted, students will identify them with their guidebooks. During the walk, learners will fill in their journals and mark down what species they see and how many of each.
3. Log the activity in the classroom with the appropriate piece.

Catch and Release Nocturnal Trapping: Set Traps¹⁵

Aim: To find out which nocturnal animals occur in the desert and to identify them using guidebooks. To become aware of the importance of releasing wild animals back into their habitat and to teach the learners about the different trapping methods.

Description: This is a short activity that involves setting two different types of traps, pitfall and Sherman, overnight to catch nocturnal animals. The following morning the learners will identify each species and record what they have caught in their traps.

Directions:

1. Explain the two types of traps that will be used to catch animals that are active at night by drawing pictures on the classroom whiteboard. When the classroom introduction is finished, pass out the traps to each team, giving the learners their assigned traps, and tell them to find an area where their team will set their traps. Check that learners are placing traps correctly and help if needed.
2. Fill in the activity log in the classroom.

¹⁵ *Ibid.*, pages 23-24.

The Mantis and the Moon

Aim: To use a folktale that students may have heard of before make the connection between humans respecting and appreciating nature, rather than trying to conquer the natural environment.

Description: This could be a puppet show, or the educator could read the book out loud, and use pictures to illustrate. At the end students will draw what happened in their journals and can make up or use another folktale to explain why an animal has a certain behavior or physical characteristic (i.e. the mantis stands up to show respect to the moon).

Directions:

1. Students listen to “The Mantis and the Moon” story (in *Nelson Mandela’s Favorite African Folktales (2002)* pages 62-65), which is illustrated with pictures or a puppet show. They will then draw their own pictures for the story or make up their own folktale that explains why another animal has a certain characteristic. For example: why does the oryx have two straight horns? Why do springboks leap? Why do leopards have spots? They can share these with the class if they’d like.

Day Three:

Day Three combines points 2 and 3 of the Earth Charter to become “The Global Situation: Challenges for the Community.” On day three, there is a focus on sharing resources and leaving some for future generations. In particular, students will look at collecting firewood for use as a fuel source, wasting water, and overconsumption of resources, as these are pressing issues in Namibia. The third day would also look at the negative interactions between humans and their environment and would provide a balance to days one and two, which focus more on appreciating nature. In other words, day three will be used to show what happens when students do not appreciate and respect their environment. This would be linked further to include respecting one another and the evening activity will focus on treating others with respect.

Nocturnal Trapping: Check Traps¹⁶

Aim: To give learners an up-close view of the animal species of the desert and to have them accurately identify them using the guidebooks.

Description: The traps that were set the night before will now be checked to see which animals were caught and learners will record their species.

Directions:

1. First, the educator will explain the proper way to check traps and release species. Then, NaDEET staff will go up to the top of the dune with the learners and collect traps. When students find their traps, have them identify their species using the guidebooks. They will then draw the animals in detail and write how many of each they have caught in their journals.
2. Fill in the activity log.

Leave Some for the Rest

Aim: To show students the importance of saving resources for the future.

Description: Students will use beans (or rice grains), which symbolize resources, in order to show why it is important to conserve resources and to save some for future generations.

Directions:

1. Split the kids into groups of 10. Have one group demonstrate how the game will be played and the others will learn by watching. Tell them that the object of the game is to be the first to get 10 beans and the person who does so will get a prize. Each group of 10 students will sit in a circle with 25 beans in the center. Each round will last 30 seconds. At the end of each round the amount of leftover beans is doubled. If there are no beans left, the game is over. Therefore, the object is to leave some beans behind so that they are doubled the next round and everyone can take some. Once all groups have figured out how to play the game and one student has 10 beans, discuss what the beans are meant to represent: natural resources. There will be plenty of resources for everyone if people leave some for the future. Explain why this is important and relate it to conserving biodiversity and preventing overconsumption. (Kriesberg and Frederick 1999: 119).

¹⁶ *Ibid.*, pages 25-26

2. Record this activity in the log.

Water Count

Aim: To monitor how much water students use during the week and to show the importance of conserving water.

Description: As part of the Environmental Footprint Activity students will monitor their water throughout the week. For the first two days of the program water monitoring will be done by NaDEET staff. On Day 3, students will begin to monitor their water and see how much they have used during the week so far.

Directions:

1. All girls go to all of the girls' houses, and all of the boys go to the boys' houses to read the water tanks and figure out how much water was used. For every 5 liters of cold and hot water used by each house, one "water droplet" (a small droplet made out of wood and painted blue for cold and red for hot) will be placed outside the shower building under each day's heading. Some droplets will already be hanging up outside the homes because NaDEET staff has monitored the water usage on Days 1 & 2. Students will be informed about what the water droplets stand for and will draw them in their journals for each day. Everyone will then sit in a circle near the large camelthorn tree and look around to see which house has used the most, and the least, water. They will then draw those colors in their books for each day (with help from NaDEET staff in pointing out who used the most and least on Days 1 & 2. The students will then go to the classroom and record this on a large poster for the week, where water droplets are drawn (or taped) under each house as another visual representation of how much water has been used.
2. Fill in the corresponding piece on the activity log.

Our Impact & PSAs

Aim: To have students demonstrate their understanding of the consequences of negative human activities on the environment.

Description: This activity is in two parts. First, students will reflect on negative human activities; and second, they will draw posters highlighting the environmental problems caused by

these activities. These posters will go home with the students and hopefully can be hung up at their school.

Directions:

1. Our Impact:
 - a. Students will be introduced to environmental problems that are directly caused by humans. In this activity, students will match the photo of an environmental problem to its source (i.e. littering and a bird with a soda six-pack ring around its neck). Each student will be given a picture of a problem or a cause and will walk around to find the person who matches up with their photo. Once everyone thinks they have found their match, they will work with that partner to do the second part of the activity.
2. PSAs:
 - a. Students have now made the connection between human activities and how they affect their environment. They will then create “public service announcement” posters (using art supplies, magazines, etc.) to explain these issues to other kids at their school. They will work with their partners to design a poster that represents the issues shown on their cards. When they finish, they will present their posters to the class who will sit in a circle during the presentations. These posters will be taken home and can be hung up in the school to educate other students and teachers.
 - b. After they have watched the presentations, the students will fill-in the pages in their journal that correspond to these activities. Each journal will have a space where they can glue pictures to create the matches.
3. When finished, students will fill in the activity log for this activity.

The Mother Who Turned to Dust

Aim: To make a connection between respecting the environment and respecting ourselves, and others.

Description: Students will listen to the story “The Mother Who Turned to Dust” (also in *Nelson Mandela’s Favorite African Folktales* (2002) pages 118-123), which is about the origin of the Earth and how Mother Earth feels when others neglect her or treat her badly. The story ends with

Mother Earth upset because the children are quarreling, and this will be used to link respecting Mother Earth and respecting each other.

Directions:

1. The students will hear the story about Mother Earth called “The Mother Who Turned to Dust,” which will be illustrated through drawings or pictures. At the end, they will get into groups and talk about what the story means. This will turn the focus to appreciating and respecting Mother Nature. They can then draw pictures that compare students disrespecting each other and the Earth, and how Mother Earth wanted them to behave.
2. Instead of drawing individually, students could draw their pictures in a circular art mandala, which would allow them to practice respecting others by sharing the space and art supplies.

Day Four:

Day Four is focused on taking action for the environment and making the link between all the weekly activities. On day four, students will learn practical skills (making recycled firebricks), and also demonstrate what they have learned through the week.

Trash Into Treasure

Aim: To introduce the 3Rs to the students and allow them creative space to make new items out of recycled or reused products.

Description: All kids will bring at least one, (hopefully a few items), item to NaDEET that they can recycle or reuse. For example, they could bring empty soda cans, food containers, cardboard rolls from paper towels, or anything they no longer use for its original purpose and that can be re-used to make art or a recycled item at the Center. Students should collect this stuff before their trip. This also encourages teachers to prepare students ahead of time for their visit to NaDEET.

Directions:

1. Begin with an introduction to the 3Rs (reduce, reuse, recycle) to explain what they mean and give examples of each. Then use the projector to show pictures of reducing, reusing and recycling and ask the students to guess what each photo represents. Students will then take out the objects that they brought from home and create new items in their classroom teams or in smaller groups. These can be pieces of art or practical items, like a

pencil case. Encourage students to be creative. Also play Jack Johnson's 3Rs song for the class.

2. Record the activity in the classroom.

Recycled Fire Bricks

Aim: To gain knowledge and hands-on experience in recycling, reusing and reducing as means of improving our environment.

Description: Learners will review the three Rs and will then use their understanding of the 3 Rs to create their own recycled firebricks.

Directions:

1. Earlier in the day, students have learned about recycling. They will now make recycled firebricks that are used for the fuel-efficient stoves that heat water in the morning before solar energy use is possible. Each classroom or house team will work together to rip up newspapers and recycle them into firebricks.
2. The activity will be recorded in the classroom activity log.

Water Count

Aim: To monitor how much water students are using and to show the importance of conserving water.

Description: As part of the Environmental Footprint Activity students will monitor their water throughout the week. For the first two days of the program this will be done by NaDEET staff. On Day 4, students will monitor their water usage since Day 3 and see if they have increased or decreased water consumption. Conclusions will be drawn from the week to see who has used the most and least, and how students can continue to reduce their water usage.

Directions:

1. As with Day 3, all of the girls will go to all of the girls' houses, and all of the boys will go to the boys' houses to read the water tanks and figure out how much water was used since Day 3. For every 5 liters of cold and water used by each house, one "water droplet" (a small droplet made out of wood and painted blue for cold and red for hot) will be placed outside the shower under each day's heading. After these droplets have been

- placed outside each shower, under the proper day, and each student has drawn the droplets in their journals, all students will gather in the classroom to look at the results.
2. The results will be recorded on a large poster for the week, where water droplets are drawn (or taped) under each house as another visual representation of how much water has been used. Students will explain who has used the most and least for the day, and for the week. Students will discuss how they can save more water and a slideshow of “water wasting” activities will be shown and students will have to explain why they are not saving water. For example, a picture of a running tap will be shown and students will explain what is wrong. Next, a photo of a shower with a clock that says 30 minutes will be shown and students will have to point out the problem here as well. Once students have finished with the water monitoring, they will move onto the “Measuring Our Enviro Footprint” activity.

Measuring Our Enviro Footprint

Aim: To monitor how much waste and energy was used at NaDEET during the week. Students will then discuss why it is important to utilize the 3Rs and save energy.

Description: Students have looked at how much water was used during the week and they will now weigh the trash produced and count how many hours they have solar cooked throughout the week.

Directions:

1. Students will first collect their trash from their houses, showers and bathrooms. They will return to the classroom and look at a slideshow of pictures that show people throwing away recyclable items and littering. Students will be asked to say what is wrong with each picture (as they did with the water slideshow). Once they have gone through the pictures, they will weigh their trash and write the results in their journals. Two main questions should be answered during the Enviro Footprint as a way of evaluating students’ consumption during the week: Did students create more recyclable waste than non-recyclable waste? Did the students create less waste than other groups at NaDEET Center (they will compare with help from NaDEET staff in providing the statistics from other groups)? In their journals, students will write down how much waste they created during the week and the answer to those two questions that will be glued into their

journals. They will mark the answer using a check and a smiley face if they answer, “yes” to both questions. Students will then do a similar activity related to energy usage during the week as they will look at people wasting energy and using fossil fuels and say why each activity is bad for the environment. Then, they will look at how many hours they cooked with solar. With help from NaDEET staff, they will glue in pre-printed slips of paper and answer a few simple, picture-based questions. For example, students will circle a picture of a solar cooker under the question what creates the least pollution?

2. At the end of the Enviro Footprint activity, students will make ornaments (out of recycled materials) or tie a string to the tree (activity log) they have been building throughout the week to symbolize their pledge to behave responsibly towards the environment. These could also be decorations for the interior of the classroom so that every kid leaves a mark on the center.

Acting for the Environment

Aim: To demonstrate what learners have learned throughout the week and to allow them to communicate how they will take care of the environment.

Description: The students will be split into their classroom or house teams and will each make up a skit that they will perform that shows how they will act responsibly towards the environment.

Directions:

1. Split the students into house or classroom teams and explain that they are going to make up a skit where they show how they will take care of the environment, or what they have learned at NaDEET. If necessary, the groups can be given prompts or ideas from NaDEET staff to spark their creativity. If there is a smaller number of students, they could be divided into 4 groups and given an issue that is part of NaDEET’s four focus areas: waste, energy, water, and biodiversity. After each group has prepared a skit, they will perform it for the group.

Timetable

Below is the timetable for the Lower Primary curriculum. Note that the breaks are standard and allow for “informal” learning through the utilization of decomposing toilets, bucket showers, time to observe a myriad of recycled and reused materials used to build the center and educational paintings. Students also take this time to solar cook their meals, explore the library, and play games in the desert sand.

Lower Primary Programme

TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Theme	<i>Earth, Our Home & Our Ancestors</i>	<i>Exploring and Appreciating Nature</i>	<i>The Global Situation: Challenges for the Community</i>	<i>Individual and Collective Responsibility</i>	<i>Departure Day</i>
6:15		Breakfast preparation	Breakfast preparation	Breakfast preparation (check weather)	Bring Luggage to Truck
6:30					Clean Centre
6:45					
7:00					
7:15		Breakfast	Breakfast	Breakfast	
7:30		Breakfast cleanup	Breakfast cleanup	Breakfast cleanup (check weather)	
7:45		Scientists in-Training	Nocturnal Trapping: Check Traps	Trash Into Treasure	Walk to Bus
8:00					Depart (Group takes a packed breakfast and lunch)
8:15					
8:30					
8:45					
9:00		Break	Return Traps		
9:15		Powered by the Sun	Break	Break	
9:30					
9:45					
10:00					
10:15		Solar Cooking Hour for lunch and dinner	Leave Some For the Rest	Solar Cooking Hour for lunch and dinner	
10:30					
10:45		The Namib's Secrets	Solar Cooking Hour for lunch and dinner	Recycled Fire Bricks	
11:00					
11:15					
11:30					
11:45	Small Break	Lunch	Lunch		
12:00					
12:15	Environment as Art	Lunch cleanup	Lunch		
12:30					
12:45	Lunch	Break	Break		
13:00					
13:15					
13:30					
13:45	Welcome & Living Teams	Break	Water Count		
14:00	Intro to Accomodation				
14:15	Move In			Water Count	
14:30					
14:45					
15:00					
15:15	Introductions	Break	Measuring Our Enviro Footprint		
15:30	Classroom Teams	Dune Walk	Our Impact	Break	
15:45					
16:00					
16:15					
16:30	Leaning on the Earth	PSAs	Dune Boarding & Group Photo		
16:45					
17:00	Rules	Nocturnal Trapping: Set Traps	Break		
17:15					
17:30	Break	Break	Break		
17:45					
18:00	Dinner group preparation	Dinner group preparation	Dinner group preparation		
18:15					
18:30					
18:45					
19:00	Dinner clean-up	Dinner Clean-up	Dinner Clean-up		
19:15					
19:30					
19:45					
20:00	NaDEET Slideshow	The Mantis and the Moon	The Mother Who Turned to Dust	Acting for the Environment	
20:15					
20:30	Break	Break	Break		
20:45					
21:00	Lights out (Time To Be Determined)				
21:30					

Chapter 10: Implementation and Evaluation

Curriculum Inventory

According to Hungerford and Peyton, after the curriculum has been developed it must be assessed for gaps and weaknesses (Volk 1997: 64-67). If there are any necessary areas that have not been covered in the curriculum, they must be added to fill in these educational gaps. They suggest using an inventory to determine what needs to be added or is missing. I have created a curriculum inventory, modeled off of Gardella’s, that reflects whether the goals and teaching methods have been successful (cited in Volk 1997: 70-73). This inventory will be used to assess how well each of the sub-goals is being met by the current curriculum. The following scale will be used to assess whether NaDEET has reached the goal, ranging from “not at all” to “very well”:

Evaluation Scale:	Not at All 0	Poorly 1	Slightly 2	Fairly Well 3	Very Well 4
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Goal Level 1. Ecological Foundations	
1. Environment: Students know the 3 components that make up the environment (living, non-living and human-made things).	
2. Dependency on Earth: Students know how humans use the environment and different plants and animals.	
3. Populations: Students know what animals live on NamibRand Nature Reserve.	
4. Ecology: Students have done basic ecological observations and experiments.	

5. Solar Power: Students have a basic understanding of how solar power works, and how solar ovens, solar cookers and the hot box works.	
Ecological Foundations Total: Add score for questions 1-5.	
Ecological Foundations Average: number above divided by 5	

Goal Level 2. Issues and Values	
1. Students have developed an appreciation of nature through art.	
2. Students have been exposed to the biodiversity of the Namib and have observed a variety of species on the dune walk.	
3. Students are aware of how folktales have disseminated ideas about the environment for centuries and are able to recall at least one myth.	
4. Students have come into intimate contact with biodiversity through trapping and understand how to ethically investigate plants and animals.	
5. Students understand how alternative technologies can save money and improve the quality of life.	
Issues and Values Total: Add score for questions 1-5.	
Issues and Values Average: Number	

above divided by 5.	
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Goal Level 3. Investigation and Evaluation	
1. Students have identified a solution to overconsumption of resources through the “Leave Some for the Rest” activity.	
2. Students have investigated their water usage and recorded and discussed the results.	
3. Students have investigated human activities that lead to environmental problems and can properly identify the cause of each problem.	
4. Students understand how to solar cook and have recorded how many hours they have solar cooked throughout the week.	
Investigation and Evaluation Total: Add score for questions 1-4.	
Investigation and Evaluation Average: Number above divided by 4.	

Goal Level 4. Environmental Action	
1. Students can adequately communicate environmental problems and solutions to other students and teachers.	
2. Students understand the difference between recycling, reducing and reusing.	
3. Students have created something from a recycled or reused item.	
4. Students take a practical skill home with	

them that can improve their community and family life (i.e. recycled firebricks).	
5. Students know how to measure their environmental footprint and how to reduce it.	
6. Students can demonstrate what they learned over the weeklong NaDEET program.	
Environmental Action Total: Add score for questions 1-6.	
Environmental Action Average: Number above divided by 6.	

Goal Level 5. Teaching Methods and Practices	
1. Does NaDEET staff use a variety of teaching methods?	
2. Are the materials appropriate for ELLs and easy for them to understand?	
3. Do the activities spark student interest?	
4. Do the materials allow for problem-solving and student creativity?	
Teaching Methods and Practices Total: Add scores for questions 1-4.	
Teaching Methods and Practices Average: Number above divided by 4.	

When the inventory is complete, the next two steps in the design of an EE curriculum are to train teachers to properly implement the curriculum and to develop an evaluation method. Because teachers already go through a training program at NaDEET, incorporating the Lower Primary program into the training should not be an issue. However, as shown in the earlier

survey reports, the evaluation of the program should not depend solely on written responses and standardized questions.

Evaluation

It is important that the evaluation of the Lower Primary program is as flexible as the program itself. The evaluation needs to be ongoing and continue throughout the week. In particular, the evaluation should happen after each activity where students are expressing their creativity and what they have learned. For example, the best time for a comprehensive evaluation will be during the evening activity on Day 4 when students are to come up with a skit that shows how they will take care of the environment. This particular activity will be used to assess how much students have learned and what type of environmental action they will take in the future.

Implementation

As of December 2010, the curriculum that I have designed for NaDEET has not yet been implemented, as corresponding materials still need to be created. However, the program will be sent to the director of the organization and given a “trial run” so that adjustments can be made as necessary. During the early implementation phase, the director and NaDEET staff can rate the program and how well it meets the above criteria. This will allow activities to be reworked or added. Once a finalized program is determined, an activity guide will be developed to assist and guide educators in carrying out the activities as they were designed. I look forward to feedback and comments on the program and will happily work with NaDEET to realize the Lower Primary program.

Chapter 11: Conclusion

Looking at the history of Namibia, it is obvious that the colonists greatly affected how indigenous Namibians were treated, especially because they did not allow them access to any form of “real” education. Even today, the ramifications of colonial disparities are profoundly apparent in Namibian land ownership statistics and access to the country’s resources and wealth. Many Namibians still live in the rural areas where they forcibly migrated to just over 100 years ago. These Namibians are often in the greatest need of educational resources as they face many barriers including geographical isolation, lack of transportation and financial support. NaDEET strives to educate all Namibians about the environment, and especially those from the rural southern parts of Namibia whose livelihoods directly depend on the availability of natural resources. It is imperative that these Namibians learn about alternative energy technologies, waste management, water saving strategies and biodiversity conservation in order to ensure their survival. Furthermore, sustainable technologies can empower women and create new forms of income for communities.

NaDEET’s Upper Primary program, although deemed successful with English-speaking students, does not appear accessible to English Language Learners. It is thus of vital importance that a separate program is created to meet the special needs of these students. The curriculum that I have designed strives to provide varied teaching and classroom methodologies, abundant opportunities for student problem-solving and creativity, and an ELL-appropriate introduction to sustainability. I have attempted to use the following steps in order to design experiential, environmental education activities: 1) create the opportunity, 2) involve the learner in an experience, 3) process (discuss) the experience, 4) generalize the experience to other situations, and 5) apply the knowledge (Heimlich and Daudi 2002: 28). Furthermore, the curriculum aims to

promote critical thinking skills in students, which are essential in solving Namibia's environmental problems. As a volunteer at NaDEET, I noticed that ELL students possessed a lot of indigenous knowledge about plants and animals and I wanted to incorporate that into the Lower Primary program. Through folktales, I hope to encourage students to think about their own indigenous knowledge about the environment and to value their cultural backgrounds. The ultimate success of this program will come after trial and error. Designing an appropriate program from the United States for students in Namibia – even though I spent time there - is an incredibly difficult task. I hope that in some small way I have contributed to not only effective environmental education for all Namibians, but also to the advancement of NaDEET as an organization.

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Appendix A:

NaDEET Centre Primary Student Arrival Questionnaire

School: _____	Grade: _____	Age: _____
Circle one: male female		
Circle where your family lives: city town village farm		

Please circle the answer that best matches with you:

1. People in Namibia should be allowed to use many natural resources (like minerals, plants and animals) as they want.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

2. It is okay to dig mines in the Namib Desert.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

3. Namibians should recycle more of their rubbish.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

4. I should be allowed to use as much water as I want at home.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

5. In school, we should have a class where we learn about the environment.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

6. Have you ever seen or heard of a solar cooker or solar oven?

1	2
Yes	No

7. Have you ever heard of “sustainability”?

1	2
Yes	No

8. Have you heard of “climate change” before?

1	2
Yes	No

9. Which cooking fuel uses the LEAST energy?

- A. Gas
- B. Electricity
- C. Solar
- D. Fuel-efficient stove
- E. Open fire

Answer: _____

10. Which of these is part of the environment?

- A. Oryx
- B. Camelthorn tree
- C. Air pollution
- D. All of the above

Answer: _____

11. Have you been to NaDEET Centre before?

1	2
Yes	No

Thank you very much for filling out our survey!

When you are finished, please hand it in to one of the

NaDEET teachers.

NaDEET Centre Primary Student Departure Questionnaire

School: _____ Grade: _____ Age: _____

Circle one: male female

Circle where your family lives: city town village farm

Please circle the answer that best matches with you:

1. People in Namibia should use as many natural resources such as water, plants and animals as they want.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

2. It is okay to dig mines in the Namib Desert.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

3. Namibians should recycle more of their rubbish.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

4. I should be allowed to use as much water as I want at home.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

5. In school, we should have a class where we learn about the environment.

1	2	3	4	5
Strongly Agree	Agree	Don't Know	Disagree	Strongly Disagree

6. Do you think your parents will buy a solar cooker or solar oven when you go home?

1	2	3
Yes	No	We already have one

7. At home, do you know where to take your recycling?

1 2
Yes No

8. Which cooking fuel uses the LEAST energy?

Please write your answer: _____

9. Which of these is part of the environment?

- E. Computers
- F. Windhoek
- G. Springbok
- H. All of the above

Answer: _____

10. What were your favorite parts of this NaDEET visit?

11. What did you NOT like about this NaDEET visit?

12. Have you been to NaDEET Centre before?

1 2
Yes No

**Thank you for coming to NaDEET and tell everyone at home
about sustainable living! Hand in the survey to a NaDEET teacher
when you are finished.**