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INTEGRATING SUSTAINABILITY INTO THE NAMIBIAN CURRICULA THROUGH AN ONLINE MODULE

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Integrating Sustainability into the Namibian Curricula through an Online Module

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INTEGRATING SUSTAINABILITY INTO THE NAMIBIAN CURRICULA THROUGH AN ONLINE MODULE

An Interactive Qualifying Project

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WORCESTER POLYTECHNIC INSTITUTE

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Sponsoring Agency: EduVentures Trust

Report submitted to:

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ABSTRACT

Current social practices are causing the planet damage. In Namibia, EduVentures, actively provides environmental experiences mainly for disadvantaged Namibian youth. EduVentures is currently trying to promote Education for Sustainable Development (ESD) and has tasked us to integrate sustainability into the Namibian curricula by creating an interactive online module. After assessing a past module that was created by a previous group that worked with EduVentures, we developed content for the module, received feedback from EduVentures and their partners NaDEET (Namib Desert Environmental Education Trust), and created a module that contained five topics on sustainability. This module will be used for a teacher training workshop at NaDEET.
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- **Our sponsor, Corris Kaapehi and the Eduventures staff**, for their constant guidance, support, and advice for this project.

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AUTHORSHIP

Jessica Antoine - Jessica served as the main editor of the paper by reading over and editing every section. She created the topic “Waste” of the Sustainability Module. In the report, Jess served as the primary author of the Abstract and Introduction and contributed to edits throughout the entire paper.

Salome Arizari Maldonado - Salome served as the creative expert for the modules by utilizing her imaginative personality. She created the “Energy: Household & Transport”. In the report, Salome contributed to several sections throughout the paper and served as a key editor for the findings. She also contributed as a secondary editor for multiple sections of the report.

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Meron Yishaak Tadesse - Meron served as the main interviewer for a majority of the data collection observations. She created the ‘Education for Sustainable Development’ and ‘Taking Action for Global Citizenship’ topics and served as the point of contact between EduVentures and our team when performing outside activities. In the report, Meron contributed to several sections throughout the paper and served as the primary editor of the Methodology chapter. She also served as a secondary editor for several sections of the report.
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LIST OF ACRONYMS

DESD: Decade of Education for Sustainable Development

ESD: Education for Sustainable Development

IQP: Interactive Qualifying Project

MEC: Ministry of Basic Education, Culture, Youth and Sport

NaDEET: Namib Desert Environmental Education Trust

SACMEQ: Southern Africa Consortium for Monitoring Educational Quality

SMART: Sustainable, Measurable, Attainable, Rationale, and Timely

UNESCO: United Nations

WPI: Worcester Polytechnic Institute
EXECUTIVE SUMMARY

Current social practices are causing the planet damage. If society continues such unsustainable practices, then we will face the catastrophic effects of climate change. In order for this to be avoided, the awareness of sustainability and environmental education is imperative. Therefore, Education for Sustainable Development (ESD) has been established. The goal is to empower people to change the ways they think and work towards sustainable development. ESD is about including sustainable development issues such as climate change and sustainability into teaching and learning practices (UNESCO, 2019). Sustainable development is a crucial way to decrease the rate of environmental degradation (Valentiny, 2016). The United Nations Educational, Scientific, and Cultural Organization (UNESCO) has been leading the goal of ESD implementation worldwide. Although the Namibian government has created basic educational goals that coincide with UNESCO’s goals for ESD, there is still a lack of environmental education, including sustainability, implementation into the Namibian school curricula (Boccio, 2018). In Namibia, EduVentures, our sponsor, actively provides environmental experiences through the implementation of ESD for mainly disadvantaged Namibian youth. EduVentures has created several different programs to teach environmental education through unconventional and creative means. The organization uses techniques such as comics, multimedia, and comedy to facilitate the teaching of various topics including sustainability. The most recent program EduVentures has created is the EduLink project, which uses a learning management system to connect different ESD centers around Namibia. EduLink utilizes online modules to educate teachers on various sustainable development topics. The teachers can then use the knowledge they have received and share it with the students of their classroom.
EduVentures has tasked us to integrate sustainability into the Namibian curricula by creating one of these interactive online modules. Sustainability involves not harming the environment or depleting natural resources to maintain long-term ecological balance or the harmonious existence between organisms and their environment (Asheim, 1994). The main goal of this module is to integrate sustainability into the classroom curricula in an interactive and creative manner. To achieve this goal our team developed three objectives: to evaluate the effectiveness of the previously created EduLink Biodiversity module and gain feedback from its users, to design an interactive module that focuses on sustainability in Namibia, and to implement the sustainability module into EduVentures’ partner’s, NaDEET (Namib Desert Environmental Education Trust), teacher workshop.

To determine the structure and content of our module we assessed the past EduLink biodiversity module. We surveyed and interviewed ESD educators who attended the workshop on the Biodiversity module. The educators informed us of what they wanted to be included in our module as well as what they did not find useful from the previous EduLink biodiversity module. We also performed a secondary data analysis on the pre and post assessments given from the previous EduLink biodiversity module to understand if we needed to focus on including educational content into our module or techniques to present the educational content. Once we determined the necessary criteria for our module, we began to develop our module.

The content outline of our module was provided by NaDEET as well as areas that the topics could be implemented into the curricula. We began the development of our module using the software known as SMART Notebook. The first step was to learn the features of the software and the next was to develop the Sustainability module. Our module contained five different topics on sustainability. The module’s topics were Sustainable Development and Education for Sustainable Development, Energy: Household and Transport, Healthy and Sustainable Lifestyle, Waste, and Taking Action for Global Citizenship. The module was one of the three deliverables that we produced. The other two deliverables that we were tasked to create were a Lesson Toolkit, as well as a Pre and Post Assessment. The Lesson Toolkit includes screenshots of each slide in the module, instructions on what to do for each page of the module, and additional content that relates to the information presented on each page. The pre and post assessment consists of twenty-five questions, five questions from each topic, that will be used to test the retention rate of the teachers after using the module.
After the development of the first draft of our module, we received feedback from EduVentures and their partner NaDEET. The first round of feedback with EduVentures focused on the structure and flow of the module. The next two rounds of feedback, given by staff members of NaDEET, centered around the content and structure. The final round of feedback, given by EduVentures, focused on minor modifications of the module.

Based on our overall experience from creating the module, we propose two recommendations for the continuation of the EduLink project. The next module of the project should be developed using SMART Notebook. This will not only keep many of the modules in the project consistent, but it is also accessible offline, so it can be used in remote areas. The next recommendation is that there should be more overall review suggestions throughout the entire creation of the module. It could be as simple as reviewing an outline of the module or an entire draft of a subtopic.

CHAPTER 1: INTRODUCTION

As the world's population continues to increase, natural resources become scarce. The solution to this is for individuals and society to learn how to live sustainably (UNESCO (a), 2019). While most people primarily associate sustainability with environmental conservation, it is also about people and the communities that people live in (UNT Health Science Center). Education for Sustainable Development (ESD) allows individuals to make informed decisions and take responsible action for environmental integrity and economic viability (UNESCO (b), 2019). Education for Sustainable Development is viewed as an approach to teaching or learning—a process that requires learner-centered and interactive teaching strategies such as critical thinking, participatory decision-making, value-based learning and multi-method approaches (Boccio, 2018). There are many organizations that are trying to integrate ESD into primary and secondary school curricula such as the United Nations Education, Scientific, and Cultural Organization (UNESCO) and Eduventures Trust.

Education for Sustainable Development is a collaboration to provide content and pedagogy that engages individuals in a study of the environment to encourage them to take positive actions towards it in an attempt to ensure sustainability for their societies (Boccio. et al., 2018). Learning content includes integrating critical issues such as climate change, disaster risk reduction, and
sustainable consumption and production (UNESCO (b), 2019). There has been a push to designing and teaching in an interactive, learner-centered way that enables exploratory and transformative education when teaching ESD by UNESCO (UNT Health Center).

ESD concepts and practices are rich in information and have a lot of complexity (Leicht. et al. 2018, p. 9). There have been many issues with education for sustainable development. This includes competition for time in an already overcrowded curricula, lack of cross-curricula dialog, shortage of teacher educators with strong expertise in sustainability, lack of professional development models that are congruent with learning for sustainability approaches, and an inability to strategically manage change within systems (Leicht. et al. 2018, p. 144).

There are many barriers to ESD implementation in Namibia. ESD in Namibia is hampered by dispositional, situational and institutional barriers. Education towards sustainability is not approached with an integrated effort from Namibian institutions. The Namibian curricula also lack collaborative learning and practice-oriented learning. These pedagogical characteristics are important in driving education for sustainable development (Kanyimba et al. 2018).

A Namibian educational trust, EduVentures, has been working for many years to implement ESD in Namibia through unconventional techniques such as comics, comedy, and computer-based learning. EduVentures recently began the EduLink project to connect various ESD centers in Namibia. The centers contain educators who will then educate teachers on ESD information as well as pedagogical methods. All the knowledge provided by educators to teachers will then be used by these teachers to instruct students. The EduLink project will be available on the learning platform, Google Classroom, so that it is easily accessible to all educators no matter the location in Namibia. The Sustainability module that we have created is a part of the EduLink project and will be able to be used at the different ESD centers.

The aim of our project is to design and implement an online module that focuses on sustainability in Namibia. These modules were created for ESD educators who will use the module as a guide to educate teachers on how to educate students about sustainability. A module on biodiversity was previously created with the same purpose. We have evaluated the effectiveness of the Biodiversity module to gain feedback from its users. The evaluation included a survey distributed to educators who attended the workshop on the Biodiversity module, data analysis on the pre and post assessments from the modules and interviews of ESD educators and EduVentures staff. We then
used this feedback to design an interactive module that focuses on sustainability using Smart Notebook as our software and it is compatible with the platform Google classroom, which EduVentures currently uses. We familiarized ESD educators with our module by creating a lesson toolkit, which includes additional content that the educator can use as well as instructions on how to use the module and which portions are interactive. Lastly, our team will not be in attendance for the workshop for the Sustainability module; however, we have provided a pre and post assessment for the workshop so that EduVentures can assess the retention of the educators of the module.

CHAPTER 2: LITERATURE REVIEW

1. UNDERSTANDING THE PRE- AND POST-INDEPENDENCE EDUCATION CURRICULUM OF NAMIBIA

Namibia gained its independence from Germany and South Africa on March 21, 1990. The pre-independence education was designed to divide and repress the native people. After gaining its independence, Namibia underwent several reforms in various sectors including education. The Namibian Ministry of Education, which was then known as the Ministry of Basic Education, Culture, Youth and Sport (MEC), played an important role in transforming Namibia’s education across all grades. It redesigned what and how education was distributed across the nation (Iipinge and Kasanda, 2013). MEC focused on five goals when reforming the post-independence education system of Namibia. The goals included equity, access to education, improvement of internal efficiency, quality improvement, and lifelong learning and democratic participation in education (Angula, 2010). These
goals aimed to improve the Namibian education system and curriculum which was racist and divisive during the country’s period of colonization (Iipinge and Kasanda, 2013).

Understanding the rationale behind the pre-independence Namibian education was crucial in improving and envisioning a better Namibia. The main goal of the pre-independence Namibian curriculum was to produce obedient workers for the colonizers. It was also racist and deferential to “preferred” tribes. In 2016, Professor Peter Katjavivi, Speaker of the National Assembly of Namibia, addressed the Forum of the Commonwealth Council on Education by stating:

Before Namibia's independence, the country's education system was designed to reinforce the Apartheid system rather than provide the necessary human resource base to promote equitable social and economic development. It was fragmented along racial and ethnic lines, in what was termed the Bantu Education system, which was also being enforced in black communities in South Africa, with vast disparities in both the allocation of resources and the quality of education offered. This had had a great impact on the quality of education in the country (Katjavivi, 2016).

Moreover, according to Mutuku (2009), this pre-independence education system was flawed with “the do or die final examination to an examination that incorporates the learners’ work throughout the year” (Iipinge and Kasanda, 2013). This promoted memorization and rote learning. This education curriculum was heavily teacher-centered, unlike the current learner-centered education style Namibia is pushing to achieve.

In the pre-independence curriculum, the Ministry of Education adopted South African-style national examinations in Grades 10 and 12. (Iipinge and Kasanda, 2013) After independence, the Namibian Ministry of Education implemented reforms that aimed at improving quality and equity in education. With this new curriculum, the learners were able to move towards Grade 10 without major impediments. The implemented reforms also recognized that every learner, when given the right environment and circumstances, is capable of learning at his or her own pace (Ministry of education, 2009). The goal was to give everyone basic education without unnecessary obstacles such as major national exams. The national exams that are administered after the 1990 reforms are used to assess the status of the nation’s education rather than the selection of pupils destined for further education, which was a system to deter the native black community during Namibia's colonial era. (Iipinge and Kasanda, 2013).
In 2009 Namibia’s Ministry of Education adopted a learner-centered curriculum and teaching in order to adequately achieve a knowledge-based society by 2030 (Iipinge and Kasanda, 2013). In Namibia’s Vision 2030 (2004), it states one of its main objectives is to “Accomplish the transformation of Namibia into a knowledge-based, highly competitive, industrialized and eco-friendly nation, with sustainable economic growth and a high quality of life.” The combined effort of the vision and the learner-centered curriculum paved the way for the determination and implementation of critical competencies and skills in achieving the envisioned Namibia 2.0.

To check the quality and progress of its educational reforms, the current Namibian curriculum implemented in-class continuous assessments and examinations. Additionally, Namibia joined Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ) to monitor their English and Mathematics curriculums through international tests (Iipinge and Kasanda, 2013). SACMEQ is a “cross-national assessment of students’ literacy and numeracy in Africa” (SACMEQ, 2015). So far, SACMEQ administered three exams over the course of 15 years. The analysis of the SACMEQ exam results showed that regions with better economies performed above the average results, while the nation itself performed below the regional average (UNICEF, 2011). However, Namibia showed an overall improvement and progress over the course of the three SACMEQ assessments (Iipinge and Kasanda, 2013).

2. WHAT IS SUSTAINABILITY?

Sustainability involves not harming the environment or depleting natural resources to maintain long-term ecological balance or the harmonious existence between organisms and their environment (Asheim, 1994). It requires a generation to manage resources such that the average quality of life is maintained well enough to be potentially shared among future generations. Sustainability also relates to the socioeconomics of any given area. Some areas need to rely on sustainable development because their resources are limited. Development is sustainable if it does not decrease the average quality of life (Asheim, 1994). Sustainable development can be managed in many ways, depending on the types of resources accessible.

In 2005, the World Summit on Social Development identified three core areas that contribute to sustainable development; economic, social, and environmental (Wilkins, 2008). The
environmental pillar receives the most attention and refers to the human impact on the planet. The social aspect refers to development that has the approval of stakeholders and the community that is involved. The economic aspect deals with ensuring that sustainable development is profitable to stakeholders (Beattie, 2017).

2.1 WHY IS SUSTAINABILITY IMPORTANT?

Within the last few decades, environmental issues relating to the impact and the socioeconomic forces that generate them have become globalized. These issues became more apparent along with industrialization and urbanization (Dunlap, 2012). As a result, humans worldwide have begun to endure poor environmental conditions (e.g. water contamination, air pollution, soil erosion, pesticide contamination, deforestation). Despite economic globalization contributing to environmental degradation in both poor and wealthy nations, there are ways to slow this process. Sustainable development is a crucial way to decrease the rate of environmental degradation. It is still a new concept to much of the world and sustainable practices have there still exist areas for continued development (Valentiny, 2016). If enough pressure and activism is employed by various institutions (e.g. schools, environmental organizations, governments), policies and regulations could be developed and enforced to adopt better practices (Dunlap, 2012).

2.2 SUSTAINABILITY IN NAMIBIA

Rural Namibia is known to have semi-arid desert lands that are fragile and hard to restore. Water is not easily accessible. Many residents of these areas live impoverished lives with no easy way to escape. Natural resources are a crucial part of survival in these areas. Due to desperation to make ends meet, many Namibians abuse their natural resources. According to Dunlap (2012), the people who reside in rural Namibia have pushed beyond the margins of ecological sustainability of soil and vegetation.

Rural communities in Namibia rely on groundwater, specifically aquifers, to obtain water. Unfortunately, these communities are prone to drought and the fractured-rock aquifers have complex configurations that make it difficult to monitor and retrieve water (Sarma, 2014). Sustainable
methods to obtain and monitor water have been developed, but many Namibians are uninformed. During the last three decades, land degradation in the world's arid and semi-arid countries has increased dramatically. Part of the reason that rural areas of Namibia are dealing with this is because of the misuse of land. According to the World Health Organization, much of this land degradation is due to commercial farmers overusing their rangeland (Ngutjinazo, 2018). Development initiatives aimed at slowing this rapid rate of degradation have generally been unsuccessful (Kuiper, 2002).

A defining feature of semi-arid areas is low and high variable rainfall (Baumgartner, 2016). A large amount of the land in these areas is used as rangeland for livestock farming. Even though livestock farming is intended to deal with this kind of rainfall, it is generally unsustainable with 10-20% of semi-arid areas being degraded. This is because farming systems do not focus on the long term and are enticed by the short-term financial outcome (Baumgartner, 2016). There are inadequate management strategies and the farmers do not let their rangeland rest, thereby ultimately degrading the land. It is recommended that appropriate management practices should be employed that consider both the vegetations’ and soils’ resilience and the observed localized degradation and species composition changes (Kuiper, 2002). Unfortunately, it is difficult to employ such strategies because this would impact farmers’ income. Essentially, there is an inverse relationship between financial risk management and sustainability in terms of commercial cattle farming. Financial strategies trade the short-term reduction of income risk against the system’s long-term sustainability.

Namibians rely on natural resources to provide for their daily life needs. The areas of rural Namibia are generally semi-arid which makes it difficult to maintain the land they use for livestock farming and water is not readily available. It is for this reason that sustainable development is imperative in Namibia. Unfortunately, most Namibians do not know the proper ways to manage these aspects of life and require more education on sustainable development.

3. EDUCATION FOR SUSTAINABLE DEVELOPMENT

The global movement towards a sustainable future began in 1987, in which the World Commission on Environment and Development (WCED) defined sustainable development (Paraschivescu, V., & Botez, N., 2011). This definition is as follows: “[The] development that meets present needs without compromising the ability of future generations to meet their own needs.” (Harris, J., 2003). This event highlighted the three core areas of sustainable development: economic, environmental, and social sustainability. A sustainable society must be able to maintain the
production of goods and services, natural resources, and equity among a variety of fields (Paraschivescu, V., & Botez, N., 2011). However, with established systems (e.g. countries) in place that already used short-term and profitable unsustainable fixes (e.g. oil), it became difficult to integrate sustainability. With this issue in mind, in 1992 at the United Nations Conference on Environment and Development (otherwise known as The Earth Summit), a new option was presented: Education for Sustainable Development (ESD) (Paraschivescu, V., & Botez, N., 2011).

In this conference, The Agenda for the 21st Century (Agenda 21) announced the need to use education as a means to further the understanding of sustainable development in a society. Four areas of development were promoted: quality basic education, education for sustainable development programs (ESD), public awareness and understanding of the importance of environmental responsibility (Paraschivescu, V., & Botez, N., 2011). With this initiative, the future generation would be equipped with the tools necessary to design sustainable approaches to a fast-growing industry while maintaining a healthy economy. While many countries acknowledged the need for ESD, only a few began the first steps of initiating integration (Paraschivescu, V., & Botez, N., 2011). In 2002, the UN World Summit of Sustainable Development declared 2005 to 2014 the Decade for Education for ESD (DESD). The UN reestablished a new definition of ESD: “ESD equally addresses all three pillars of sustainable development–society, environment, and economy– with culture as an essential additional and underlying dimension.” (Venkataraman, B., 2009). This soon became one of the UN’s most successful programs in initiating the implementation of ESD.

3.1 GLOBAL INITIATIVES OF ESD BETWEEN 2005 TO 2014

After DESD was declared, several global initiatives were put into place. While many initiatives were promoted, only a handful had a significant impact on education. Three notable initiatives were the European Copernicus-Campus model, the German model, and the Japanese IR3S. The Copernicus-Campus model focused on establishing a universal network of sustainability in European universities (Paraschivescu, V., & Botez, N., 2011). This network encouraged universities to commit to sustainable practices both in the curriculum and on an interdisciplinary level (Copernicus Campus, 2010). The German model took a unique approach and instead promoted a theme of sustainability each academic year until 2015. A few examples of themes include consumer behavior and public administration, biosphere reserves as places of study, and justice between
generations: human rights and ethical orientation. The Japanese Integrated Research for Sustainability Science (IR3S) program was applied to five major universities, and its focus was to develop sustainability science in “research, education, and cooperation with industry to sustainable development” (Paraschivescu, V., & Botez, N., 2011). This implemented several higher education programs in universities and promoted science and technology research in sustainability.

3.2. THE END OF DESD, THE BEGINNING OF GAP

As the era of DESD came to an end, only a few initiatives included the complete integration of ESD. Instead, many countries pursued several short-term research projects. However, this went against the original intent of ESD which was to plan long-term projects to build a sustainable society. With this in mind, in 2015 the UN initiated the Global Action Program (GAP) for ESD and included 17 new Sustainable Development Goals (SDG) for every country to strive to achieve. Overall, these goals outlined clear objectives of sustainable development and laid a foundation for long-term projects (Transforming our world, 2019). Unlike the DESD, these goals are more open to organizations outside of academia and promote a universal approach to ESD (Hopkins, C., 2015). “The SDG goals are a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity”. The goals came into effect in 2016 and will continue to guide the UN until 2030 (UNDP, 2019).

The GAP program (otherwise known as Vision 2030) was fully initiated in 2016, but before this, there were growing concerns about the implementation of sustainable development in education curricula. During the DESD era, most universities simply created an additional sustainable development program added to their current curricula as seen in the Japanese IR3S example above (Paraschivescu, V., & Botez, N., 2011). Many researchers believed that “Sustainable development cannot be integrated into existing higher education frameworks but requires a transformation of the educational system.” (Venkataraman, B., 2009). This refers to a complete change in the curricula as opposed to creating additional programs as seen in section 3.1. To promote an ideal sustainable society, all members of this society must be educated on the topic of sustainability and how it may affect their current discipline. In order words, “Sustainability is not just another issue to be added to an overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organizational change, of policy, and particularly of ethos.” (Venkataraman, B., 2009).
Unlike the DESD, only one of the SDG goals addresses sustainable education (SDG 4.7). This limits global motivation and support directed at the transformation of sustainable education (Transforming., 2019). The next section will address how this transition affected Namibia and the steps both outside organizations and the Ministry of Education took to pursue ESD.

### 3.3 NAMIBIA’S TRANSITION TO VISION 2030

After the DESD was announced, only a few outside organizations and universities of Namibia created initiatives towards ESD. One of these organizations, Gobabeb Research and Training Center, was a collaboration between the Desert Research Foundation of Namibia (DRFN) and the Ministry of Environment and Tourism (MET) (Ward, V., et al, 2014). While this was a small established organization, it created numerous successful projects that involved ESD and science. One initiative was the Summer Desertification Program (SDP) which allowed for an interactive experience in the field for over 200 students in tertiary institutions. This was a two-month program that promoted critical thinking about situations that involved the economic, environmental, and social areas of sustainability (Ward, V., et al, 2014). During this time frame, Namibian universities also began to consider integrating sustainability education into current curricula. However, integration created barriers to understanding sustainability for both educators and students (Anyolo, E., et al, 2018). These barriers are described below, and this erased the true intent behind the definition of sustainable education.

The failures of sustainable education integration in Namibian universities were categorized into three areas: institutional constraints, dispositional constraints, and situational constraints (Kanyimba, A. T., & Coetzer, I. A., 2011). Institutional constraints refer to established schedules and regulations placed by Namibian universities. For example, integration of a mandatory subject focused on sustainability would disrupt the approved schedule adopted by the university (Kanyimba, A. T., & Coetzer, I. A., 2011). Dispositional constraints refer to how the educators perceived sustainability, which relates to the point that educators often confuse sustainable education with environmental education (Anyolo, E., et al, 2018). Situational constraints refer to the lack of sustainability workshops to educate the educator on what sustainability encompasses (Kanyimba, A. T., & Coetzer, I. A., 2011).
After several Namibian self-assessments reported that cross-curricular transformation of sustainable education was necessary, the Ministry of Education decided to transform its current curriculum after GAP was announced (National Institute for Educational Development, 2019). This was based on the concept of Vision 2030 Namibia, which “sees Namibia as developing from a literate society to a knowledge-based society, a society where knowledge is constantly being acquired and renewed, and used for innovation to improve the quality of life” (National Institute for Educational Development, 2019). As stated in the first section, this curriculum change is very recent. The new primary curriculum was initiated in 2017 and the new secondary curriculum was initiated in 2018.

4. EFFECTIVE PEDAGOGY

An established platform for education and its curriculum is only the beginning step of a successful course. Much of what learning is dependent on is the pedagogical methods that a teacher implements in a classroom. Pedagogy in its simplest form refers to “interactions between teachers, students, and the learning environment and the learning tasks” (UNESCO, 2018). The use of pedagogy allows the students to be involved in and participate in their learning. The teacher must engage with the students and believe in each of their abilities to learn regardless of their own personal learning style. In order to ensure the appropriate learning occurs, the teacher must be willing to implement a range of pedagogical approaches. Effective pedagogy depends on paying particular attention to what is appropriate for a specific school and national contexts (UNESCO, 2018). The benefits of effective pedagogy are its ability to lead to academic achievement, social and emotional development, acquisition of technical skills, and a general ability to contribute to society (Craig, 1998). In this section, we will discuss the quality of teaching and its impact, as well as a variety of pedagogical methods that will create an engaging and active classroom.

4.1 TEACHING QUALITY AND ITS IMPACT

Teachers are an important aspect of an education system and their quality directly impacts what is learned throughout a course. According to Husbands and Pearce (2012), there is a strong agreement that the high performance of students in an education system is dependent on the quality of teaching provided by the educator. Barber and Moushed (2007) state that it is important to develop...
teachers into effective instructors and ensure that each child is being delivered the best instruction for them by the system. The school system must possess committed leadership in order to succeed. Therefore, for a school system to have the best education system, it must have the best teachers. Research suggests that of school-related factors, teachers matter the most in terms of student achievement (RAND, 2012).

The achievement tends to depend less on the effectiveness of the teachers themselves, but instead on how effective teachers promote the best learning for the students (Husbands & Pearce, 2012). Students believe that an effective teacher is one that focuses on the learner and engages the learner by making content interesting and motivating students to learn (Peterson-Deluca, 2016). Therefore, the quality of the teacher has less to do with their background and experience and more to do with the impact they have on the students and the way in which they are able to present the material.

### 4.2 PEDAGOGICAL METHODS

One of the main pedagogical methods is learner-centered pedagogy. This puts the focus of the lesson on the learner rather than the teacher. Instead of a teacher-dominated classroom, it becomes more democratically-dominated. The idea is that there is more room for flexibility of the lesson plan and the students are expected to participate in the structure of each lesson. There is an emphasis placed on the continuity between the knowledge that the student previously possessed and what is learned throughout the course. The student’s prior knowledge becomes a baseline for where each topic of education should begin. The purpose is to allow students to reflect on their own knowledge and learning style to result in higher retention at the end of the course. The role of a teacher becomes more of a mediator and he or she will use student’s knowledge to create an engaging and valuable educational structure and overall course experience (Rowell, 1995). A learner-centered classroom is effective because it allows the student to not only feel engaged but also allows them to learn at a pace and in a way that will benefit them for years to come.

Active pedagogy focuses on the engagement of students in their learning and educational material. Bonwell and Eison define active learning as “instructional activities involving students in doing things and thinking about what they are doing” (1991). The students construct knowledge and
understanding through different activities that pertain to a particular lesson. The activities can vary in difficulty, but the main purpose is to force students to think about what they are learning. Active learning provides an important link between activity and learning (Brame, 2018). This type of learning encourages the student to be an active participant with the hopes that it will result in higher retention of the lesson presented.

Transformative pedagogy is the idea of learning about or teaching a certain topic in a different way than is currently practiced. It forces the learner to examine and assess their views through a dramatic approach. The goal of transformative education is to “grasp the complexity of the problems, to take into account the diversity of scientific and societal views of the problems, to link abstract and case-specific knowledge, and to constitute knowledge with a focus on problem-solving for what is perceived to be the common good” (Lotz-Sisitka, 2015). It involves engaged learning rather than traditional education where information is transferred from those who know about the specific topic to those who do not. This education requires active learners who ask critical questions and search for additional information outside of the classroom rather than what is simply presented by the curriculum. It focuses on collaboration and negotiation with peers in order to challenge each student to examine their worldviews (Bjorke, 2016).

Blended learning is a form of pedagogy that combines technology and digital media with a classroom form of learning. Currently, blended learning is to be understood as “a combination of face-to-face and technology-mediated instructional forms and practices” (Nuruzzaman, 2016). The blended classroom allows educators to use technology to lecture and deliver course material, which then allows students to access information at his or her own pace. One of the most important aspects of hybrid learning is that it recognizes that not all students learn the same way so by turning a traditional classroom into a more interactive classroom. Hybrid learning also allows information to reach visual, kinetic, and auditory learners (TeachThought Staff, 2018). One perceived advantage to this approach is that it allows students to take initiative in their education and for teachers to be available in a more collaborative or discussion-based way.

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4.3 ONLINE EDUCATION
Online learning allows the teacher to adhere to the students’ pace and places the focus and responsibility on the learner. Online learning allows for the combination of different learning styles to be utilized. The online educational content can be the sole focus of a lesson or it can simply be an additional aspect of a lesson (Norman, 2017). In our module, we will use the SMART Notebook software as the main focus of each lesson, but also use additional outside resources to assist in the delivery of our module.

Online learning provides the aspect of flexibility. It is not limited to one single method of teaching. It can be presented in lectures, learning modules, activities or even assessments. The flexibility of this type of learning is beneficial to both the educators and the students. The students are engaged because the material can be tailored to their specific type of learning. The teachers benefit because they have control over the structure of the online module and can still adhere to the curriculum, but no longer in a traditional sense. However, an online course can engage students without the presence of a teacher. The teacher is no longer the main focus of the classroom and that focus, in turn, falls on the student (Levy, 2007). In the case of the online module, the teacher will run through the module and engage the educators through interactive activities and games. In some instances, research indicates that online courses can be better at engaging students and has been observed to boost retention rates up to 60%. It has become an integral aspect and popular tool of secondary learning (Clodagh, 2018).

5. EDUVENTURES

EduVentures Trust is currently working in Namibia to teach ESD through hands-on learning using real-life examples. EduVentures was initiated in 2003 and is run within the National Museum of Namibia. The original program was centered around a two-week long expedition to remote areas where a group of students, scientists, and teachers participate in collecting data about Namibia's natural and social history. In 2013, EduVentures launched the Ombombo Mobile Classroom, which broadened the reach to Namibian rural schools and communities. The specific aim of this project was to work alongside the Namibian Education system and provide interactive learning on theoretical topics addressed in the Namibian curriculum. EduVentures has recently begun a new project called EduLink that will provide teachers with pedagogical content so that there will be common teaching of ESD throughout the Namibian curriculum (EduVentures, 2007).
The project model specifically focuses on developing teacher skills in terms of ESD. The project concentrates on the training of ESD educators on the interactive module, who will then train teachers. There will be ESD centers located countrywide that will serve as locations for ESD educators and teachers to be trained in and develop relevant concepts and training techniques. This specific project will develop a module that will focus on sustainability to train educators at the ESD centers (EduVentures, 2007).

6. NAMIB DESERT ENVIRONMENTAL EDUCATION TRUST (NADEET)

For the Sustainability module, our team worked directly with two ESD centers associated with the Namib Desert Environmental Education Trust (NaDEET). One center is the main office known as the Urban Sustainability center located in Swakopmund, Namibia. The second NaDEET center is the main center in the Maltahöhe village near the Namib Desert. NaDEET is a nonprofit organization that promotes environmental awareness through sustainability education to both Namibian students and educators. NaDEET’s objectives are to encourage young students to address “relevant environmental issues through hands-on, experiential learning” and to create “a sense of respect and responsibility for their natural environment” (NaDEET 2019). The primary center in Maltahöhe promotes a sustainable lifestyle by introducing efficient alternatives for everyday commodities. This includes solar cooked food, bucket showers, and several outdoor excursions for visiting educators and students. The second center (which also houses the main office) is geared toward children and includes several hands-on activities that focus on simple urban sustainability. This center also includes a life-sized Sustainable Activity House which has dozens of household activities for students to participate in (NaDEET 2019).

Our team worked mainly with the Urban Sustainability center (Swakopmund), however, it should be noted that while both centers are associated with NaDEET, these centers have different needs. The NaDEET center uses hands-on activities and excursions rather than online modules and other technological devices. During an interview, the sponsor noted that using online SMART Boards is the opposite of what activities the main center performs. The Urban Sustainability center has the necessary SMART Board equipment needed for students to use but has limited space. Our team took these needs into consideration when building the module and this is documented in the methodology section.
7. SUMMARY

After gaining its independence, Namibia underwent several reforms to improve its educational standards. These reforms adopted a learner-centered education style and continuous in-class assessments. The Namibian Ministry of Education also joined an international assessment organization known as SACMEQ for quality checks. Sustainability was another major issue addressed by the Namibian Ministry of Education. Due to an influx of environmental issues, sustainable development is imperative for a better quality of life. Unfortunately for many rural areas, including semi-arid Namibia, sustainable development is often not implemented due to the short term financial outcome being less desirable and a lack of education on sustainability. This absence was addressed by the WCED in 1987 by the introduction to Education for Sustainable Development. Namibia has now transformed its curriculum to incorporate the main principles of sustainability to pursue Namibia 2030. Even with a transformed curriculum, an effective classroom must engage the students. For this to be achieved, a teacher must be able to implement various pedagogical methods in his or her curriculum. The use of pedagogy in a classroom is essential for student achievement and it is in tandem with online learning that this achievement can be enhanced.
CHAPTER 3: METHODOLOGY

3. DEFINING THE GOALS FOR OUR SUSTAINABILITY MODULE

Our team set a list of goals to achieve that measured the Sustainability module’s effectiveness and comprehensiveness. This rubric was used to measure the previous module as well.

The effective module will:

1. Have higher user (teacher) retention of information
2. Contain user-engaging content
3. Be accessible offline
4. Push educators to create their own SMART (Sustainable, Measurable, Attainable, Reasonable, Timely) goals
5. Have relevant and interactive activities
6. Pertain to Namibia
3.1 METHODS TO ASSESS A PAST MODULE

Before beginning the construction of our online module, we assessed the previous EduLink module that was created on biodiversity. This module was created on October 2018 by another Interactive Qualifying Project (IQP) group from Worcester Polytechnic Institute (WPI) and their project was “Edulink: Integrating ESD into Namibian Secondary School Curricula through Online Modules.” The goal of our assessment was to understand how helpful the module was to the educators, and how effective it was, in terms of engagement. We interviewed educators and NaDEET staff members while they were using the past module, administered a survey about how they felt about the module, and reviewed results from the pre and post assessments of the Biodiversity module to assist in the creation of our module.

3.1.1 ANALYSIS OF THE BIODIVERSITY MODULE ASSESSMENTS

Our first evaluation of the past team’s module was based upon an analysis of the results from both pre and post assessments. We gathered information on the educators’ background knowledge prior to the module and determined if they learned any information from the module. This was done by reviewing the pre-assessment results to see if there was little or a lot of improvement compared to the post-assessment. The previous team had already analyzed their data from their pre- and post-assessment, so we used that information to perform a secondary data analysis.

A secondary data analysis is an investigation into what is already known and what remains to be learned from results previously examined. The first step in this analysis was for us to identify the research questions that were used for the Biodiversity module. We looked at the data set from the earlier project in relation to their stated research questions to understand how they succeeded at the purpose of the project (Johnston, 2017). We performed a secondary data analysis by looking at the responses from the four educators who took both the pre and post assessments at the workshop for the Biodiversity module. We specifically looked at how many questions the educators answered correctly in both the pre-assessment and the post-assessment to determine if there was any improvement from before the module was presented to after the educators used the module. We used the information we obtained from the secondary analysis to draw a conclusion about what was learned from the modules and then looked at how those topics were presented in the module. This allowed us to understand if a specific method for teaching different topics seemed to yield the best results in terms of knowledge gained. It also allowed us to determine if the educators were coming
in with previous knowledge on these materials, which allowed us to understand if the focus of the module should be placed on the content of the educational module or on pedagogical methods.

3.1.2 SURVEY TO EDUCATORS

We distributed a survey to the educators via Google Classroom to gain insight into the use of the previous Biodiversity module. In this case, we sent the survey to educators who had previously used the Biodiversity module and attended the workshop. The survey was jointly created along with the Ocean Literacy EduVentures team in order to reduce the number of surveys distributed and increase the number of responses. The way of distributing the surveys allowed for some degree of anonymity so we were able to get unbiased results. The anonymity provided more honest answers because the educator did not need to worry about his or her identity being attached to the answers of the survey. Additionally, the survey method provided a way for the stakeholders, the people who will be using the modules, to have an input in the creation of the Sustainability module.

We administered a survey to the educators who attended the workshop on the Biodiversity module to determine if the module was helpful in their teaching. The purpose of the survey was to determine what specific aspects of the module the educators enjoyed and what they would like to see added in our module. We had some closed-ended questions to obtain concise answers. These questions were those with yes or no answers or any questions that did not result in written-in answers. Our survey was also consisted of open-ended question. The open-ended questions allowed the educator to add creative input that we could incorporate in the Sustainability module. We were then able to take all of the suggestions that were reiterated several times and ensure that they would be integrated into the module. It was also useful because we did not have to speak with the educators in person and our team was able send this survey to them at any time, which was early on just after we arrived at EduVentures. The questions we had answered in our survey are listed in Table 1 and Appendix B.

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you enjoy the Biodiversity module?</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Rating</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Why did you enjoy or not enjoy the Biodiversity module?</td>
<td>No</td>
</tr>
<tr>
<td>Were the lessons presented to you in an engaging way?</td>
<td>Yes</td>
</tr>
<tr>
<td>Were the lessons presented to you in an engaging way?</td>
<td>No</td>
</tr>
</tbody>
</table>

Please rate each section of the Biodiversity module? (1-Not helpful, 2-Somewhat helpful, 3-No opinion, 4-Somewhat helpful, 5-Very helpful)

<table>
<thead>
<tr>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>5</td>
</tr>
</tbody>
</table>

Introductory video
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<thead>
<tr>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Games</td>
</tr>
<tr>
<td>Pedagogy</td>
</tr>
<tr>
<td>Assessments</td>
</tr>
<tr>
<td>Did you enjoy the outdoor excursion to look at different plants and animals? Why or why not?</td>
</tr>
<tr>
<td>Did you enjoy the guest speaker during the workshop? Why or why not?</td>
</tr>
<tr>
<td>Did you enjoy the debate? Why or why not?</td>
</tr>
</tbody>
</table>
How suitable were the games used to present content? (1-Too simple, 2-Somewhat simple, 3-No opinion, 4-Somewhat complicated, 5-Too complicated)

1 2 3 4 5

What would you change or add to the module? Do you have any recommendations for future modules?

3.1.3 INTERVIEW WHILE EDUCATORS ARE USING THE BIODIVERSITY MODULE

We conducted an interview with EduVentures educators while they were simultaneously working through the Biodiversity module. We used a semi-standardized interview, which involved several predetermined questions or topics to ask the interviewee. However, the interviewer was also able to take some freedom with the questions and they could adapt to generate follow-up questions to probe a specific subject further (Berg, 2017). This was particularly important for our project because we needed to be able to adapt our questions depending on what section of the module the interviewee was working on.
We had the educators go through the module while we observed them and listed their comments to gain a better understanding of which components they preferred. This was done in groups of two where one person was interviewing while the other was recording the data. We were able to observe how they navigated through the module and why they were drawn to certain icons. Some of the main question topics we used as a guide are presented in Table 2 and Appendix C.

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your overall first impression of the module?</td>
</tr>
<tr>
<td>What do you like and not like about the module?</td>
</tr>
<tr>
<td>What would you like to see added to make the module better?</td>
</tr>
<tr>
<td>Do you feel it is easy to navigate through and if not, why?</td>
</tr>
<tr>
<td>Do you feel you learned something from this module?</td>
</tr>
</tbody>
</table>

**TABLE 2: INTERVIEW TOPICS FOR ESD EDUCATORS WHILE USING THE MODULES. ABOVE ARE THE QUESTIONS USED IN THE INTERVIEW WITH THE NADEET EDUCATOR.**

The purpose of this interview was to determine the usability of the Biodiversity module. We used the information obtained from these interview questions to then improve our module. We analyzed user feedback to identify the favorable aspects or implement suggestions from the interviewees.

**3.2 IDENTIFY EDUCATIONAL CONTENT FOR THE MODULE**

The content of an educational module is easily as important as the style of presentation or the pedagogical approach. NaDEET (Namib Desert Environmental Education Trust), along with Eduventures Trust, provided us with a content outline to incorporate in the module.
TABLE 3: CONTENT OUTLINE FOR TOPIC ONE. ABOVE IS THE CONTENT OUTLINE PROVIDED TO OUR TEAM BY NADEET.

The content outline is listed below in Appendix E. In this stage, our team defined the scope and depth of our sustainability module based on the content outline provided. Our team went to a secondary school in Namibia to observe teachers and their current teaching methods. We also had an informational session with Viktoria Keding, the director and co-founder of NaDEET. Based on these consultations, our team selected pertinent content and ensured its relevance to Namibia.

<table>
<thead>
<tr>
<th>Key Theme</th>
<th>Topic</th>
<th>Sub-topics</th>
<th>Links to Curriculum</th>
<th>Practical Activity Ideas</th>
<th>Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Development &amp; Education for Sustainable Development (ESD)</td>
<td>1. What is SD? Including definitions and history</td>
<td>Purple highlight</td>
<td>1. Video on SDGs from World’s Largest Lesson</td>
<td>• UNESCO website- ESD section (videos &amp; reports/ books)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. What is ESD? (SDG4)</td>
<td></td>
<td>2. SDG Game developed by NaDEET – explores the challenges and actions related to SDGs</td>
<td>• World’s Largest Lesson website</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. SDGs and related targets</td>
<td></td>
<td></td>
<td>• Globalgoals.org</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Namibian National Household &amp; Expenditure Survey</td>
<td></td>
</tr>
</tbody>
</table>

3.2.1 SECONDARY SCHOOL OBSERVATION

To make our online module successful, we observed and assessed the Namibian student learning habits by visiting a local Namibian secondary school and shadowing their teaching process. This played a crucial role in incorporating the existing learning habits and techniques into the online module. We attended three 50-minute classroom periods and observed the classroom interaction without any direct involvement. Our team split into two groups. One group observed an 11th grade biology class followed by an 11th grade chemistry class. The other group observed a 10th grade physics class. In each classroom we observed, one person focused on teacher-student interactions while the other person observed student-student interactions. We used the information from these observations to understand what methods of teaching would work well.

3.2.2 INFORMATION SESSION WITH NADEET

At the end of our first week in Namibia, our team traveled to the NaDEET center in Swakopmund to have an informational session with the director, Viktoria Keding. Mrs. Keding went over each topic in the outline she gave us as well as the content that she wanted included for each. During this session, Mrs. Keding explained the activities that she expected to be incorporated into the module and tasked us with planning the schedule for the teacher workshop. This session gave us
insight on how to approach the module and what content would be relevant to add and its summary can be found in Appendix H.

3.2.3 THE NAMIBIAN CURRICULUM ANALYSIS

Our team wanted to ensure that our module and its included sustainability topics were relevant and would fit into the Namibian curriculum. Therefore, NaDEET provided us with areas where the sustainability module’s topics were relevant to the Namibian curriculum. We also found Namibia-specific sustainability topics that would fit into the curriculum for the module, from our own research. For example, all real life photos that were presented in the module were pictures that were taken in Namibia or pictures that Namibians could relate to.

3.3. METHODS TO CONSTRUCT THE MODULE

After the content for the module was determined, the next step was to develop the online module. We used SMART Notebook to create the interactive components that were used in the module. It was important that the module was both user-friendly and engaging for the educators. We received feedback from both EduVentures and NaDEET staff members on various prototypes of the module.

3.3.1 UNDERSTANDING E-LEARNING SOFTWARE

Our goal was to look for software that was inexpensive, straightforward, interactive, and compatible with Google Classroom per request of our sponsor. Our team decided to be consistent with previous works done by EduVentures by using the same e-Learning platform in creating our module on sustainability. Therefore, we used SMART Notebook to integrate our content. SMART Notebook is a platform that comes with lesson creation tools, subject specific features and endless ways to engage students in any grade level.

We obtained access to the previous SMART Notebook lessons made by EduVentures and we familiarized ourselves with the software prior to our arrival in Namibia. This allowed us to work more efficiently, rather than spending time learning how to use the software post-arrival in Namibia. We made sure to understand its main features to ensure that we used all the capacities that SMART Notebook offered for interactive learning.
3.3.2 STUDYING USER-FRIENDLY E-LEARNING PRACTICES

While designing our module, we included user-friendly e-learning practices. First, we highlighted key points and minimized wording. Secondly, we designed the module in a way that did not interfere with its functionality to provide clear content. We also used the assertion evidence method to make our module slides more focused. Michael Alley, creator of the assertion evidence method, states “In the assertion-evidence approach, you build your talk on messages (not topics) to tell a coherent and compelling story about your work. Those messages you then support with visual evidence (not bullet lists).” This method includes audience-centered presentation techniques and focuses on creating better visual aids. Thirdly, we made the module easy to follow by giving clear cues with signifiers to click, swipe or type.

3.3.3 CONSTRUCTING MODULE COMPONENTS

When determining components for the module, our team wanted to use techniques that both engaged the user and presented useful information that could be used in a lesson plan. Our first step was getting suggestions from our sponsor, Mr. Corris Kaapehi, and the rest of the EduVentures staff on what components they wanted to see implemented. We found components to put in the module that were informative, but also used more graphics and fewer words, as suggested by an EduVentures staff member, Mrs. Maria Johannes, during our initial Skype meeting. We also implemented some of the pedagogical methods that we researched for background in our project. The plan was to present the information in a logical order so that it was both easy to follow and execute. The reason for creating this module was to help educators teach classroom instructors. Rather than lecturing, we wanted to provide interactive ways for sustainability content to be incorporated into the curriculum.

3.3.4 FEEDBACK SESSIONS WITH EDUVENTURES AND NADEET

During our time in Namibia, we received feedback on our module multiple times. The first round of feedback we received was from the EduVentures staff. At the beginning of the following week, we traveled back to Swakopmund to present our revised module to NaDEET. Mrs. Keding, Director of NaDEET, gave us additional feedback on the content of the module. We spent the middle of the week revising the module once again and presented the revised version to her for the second time at the end of the week. We spent the following week doing more revisions and presented the module to the EduVentures staff for final feedback. We received very little feedback from this session and spent the remainder of our time doing minor revisions.
3.4 PREPARING FOR NADEET’S TRAINING WORKSHOP

Since our module will be used for a workshop led by an educator that may not be familiar with the module, we created a toolkit for our module which include how to use the module, suggested schedules for activities and worksheets and provided additional content on sustainability.

3.4.1 CREATING A LESSON TOOLKIT

Our team was tasked with creating a lesson toolkit that any educator could use to understand the module and the structure of the workshop. Each topic had its own plan that included screenshots for each page. The screenshot has arrows to indicate where on the screen to click or drag. In addition to this, there were also written instructions on what to do for each page. We also included content that could be conveyed verbally for each page when the educator is teaching the teachers.

3.5. ASSESSMENT OF THE SMART MODULE

After the module was complete, our group used several methods to evaluate the assessment ratings from the educators, NaDEET staff members, and the EduVentures staff members. The qualitative portion of the methodology included all findings and observations and can be found in the Appendix. The quantitative methodology included a diagnostic assessment and a summative assessment. A diagnostic assessment refers to the subject’s previous knowledge in the area that will be studied, while a summative assessment tests the subject’s knowledge after exposure to the study (Assessment Types, 2019). The rubric mentioned is listed in section 3 of the methodology section and can also be found in Appendix A. By using these methods, we were be able to test the user engagement and retention of the SMART module and to locate any weak areas in the module design.

3.5.1 WORKSHOP SWAKOPMUND WITH NADEET

Our sponsor will be holding a teachers’ training program together with educators from NaDEET in late May. Unfortunately, our team will have left Namibia by then. Therefore, our team members will not participate in the workshop. In the past, EduVentures workshops have included different types of activities, including hands-on explorations, group discussion, and presentations to train the educators. With this in mind, our team left behind a survey for the Sustainability Module to be given at the end of the workshop. Therefore, EduVentures is able to gain feedback on the module and we hope for it to be analyzed by a future team working with EduVentures.

3.5.2 DIAGNOSTIC AND SUMMATIVE ASSESSMENTS
To gather quantitative data, our team used a diagnostic and summative assessment. A diagnostic assessment refers to the subject’s previous knowledge in the area that will be studied, while a summative assessment will test the subject’s knowledge after exposure to the study (Assessment Types, 2019). With this assessment, we tested the knowledge of the user before and after exposure to the sustainability module.

Since our team is unable to participate in the teacher training workshop our team is unable to assess any immediate post assessments. In order to still record results after our project end, our team has incorporated an assessment at the beginning of the module to evaluate the users’ initial knowledge in understanding sustainability. The same assessment will be given at the end of the workshop to evaluate whether the teacher has gained any knowledge from the sustainability module.
4.1 INITIAL CONSTRUCTION OF THE MODULE

Before our team began the construction of the Sustainability module, we pursued the different methodologies introduced earlier to gain a better understanding of what content and information should be presented in the module. Our team also needed to decide how to present this information in a matter that followed the module goals in Section 3.1.

4.1.1 SURVEY TO EDUCATORS

Within the first week, our team sent out a survey to assess the Biodiversity module using Google Classroom and received feedback from eight ESD educators who attended the Biodiversity module workshop. We found that seven out of eight educators enjoyed the module while one stated that “It was okay.” Most educators enjoyed the Biodiversity module due to the structure and concepts it reviewed but found the Biodiversity module lacking in terms of relevance to Namibia. These responses can be found in Appendix B. When the educators were asked if the information contained in the module was presented in an engaging way, seven out of eight responded positively.

The educators were asked to rate each of the various sections of the Biodiversity module on a scale of one (being the least helpful) to five (being very helpful). Each individual rating of the five sections can be found in Appendix B. To gain a better understanding of the consensus of each section, we took a total score and found the mean as seen below in Figure 1 and Figure 2. The highest score
that could be achieved for Figure 1 was a score of 40. The highest score that could be achieved for Figure 2 was a score of 5.

**FIGURE 1: BIODIVERSITY MODULE OVERALL SCORE BAR GRAPH.** Above is the graph showing the satisfactory scores of the biodiversity module. Note that the overall score is out of forty for each section of the biodiversity module.
The video and assessment sections of the module received the highest rating and the notes section received the lowest rating overall. This survey question allowed us to understand that the introductory video and assessments sections were well received by educators, whereas, the notes section was not as valuable to educators. However, this did not provide the information for why the notes section was rated lower than the other sections. Through further questions, we learned that the notes section contained text heavy. Many of the educators recommended that the wording should be reduced and replaced with more visuals and hands-on activities. The educators also wanted the module to contain more Namibian specific examples so that it was more practical in the context in which it is being used.

There were additional activities at the workshop that were supplemental to the online module. We asked the educators if they enjoyed each of the activities, which included an outdoor excursion, a debate, and a guest speaker. We found that the feedback for the supplemental activities was very positive and people liked that the focus was taken away from online activities and shifted to hands-on activities. From this feedback, we felt free to take liberties with our module and not focus entirely on the online components of the module. We were able to include debates that could be done on each of the topics as well as games and activities that required excursions and could not be done on the
computer. The information that was gained from the educator survey allowed us to make decisions on the implementation of certain components into our own Sustainability module.

4.1.2 INTERVIEW OF EDUCATORS

To gather live feedback on the Biodiversity Module’s significance to educators after it was presented by the past A-term Namibia 2018 IQP group, our team scheduled an interview with Pandu Haindongo, a NaDEET staff member and an Environment Educator. This meeting took place in Swakopmund, Namibia after the information session with NaDEET (described in Section 4.2.1). Due to time constraints and limited Wi-Fi access, a full interview was not conducted as expected. Mr. Haindongo stated that he enjoyed the outdoor excursions and debate that was associated with the teacher training program that the past IQP group created. Mr. Haindongo had limited memory of the Biodiversity Module itself and when we presented it to him, he stated that he liked the online games that BookWidget used. While our team was able to have Mr. Haindongo fill out the Biodiversity Module feedback survey, due to the survey’s anonymous responses, we were unable to identify which responses were his.

4.1.3 SECONDARY DATA ANALYSIS OF PRE AND POST ASSESSMENTS

The Biodiversity module contained both a pre-assessment and a post-assessment. The pre-assessment was used to show the baseline of educator knowledge prior to the Biodiversity module workshop. The post-assessment contained the same questions as the pre-assessment to understand what knowledge was retained from the module. We used these assessments to determine if our module should focus on providing educational content on ESD or focus on how to implement this content into the classroom.

Six educators completed the pre-assessment, but only four educators completed both the pre-assessment and the post-assessment. We chose to only look at the information for the educators who completed both to make the correct conclusions for our purposes. There were limitations explained by the Biodiversity module team. They mentioned that the post-assessments were taken immediately following the module lessons and the educators still had access to these modules.
After reviewing the results of both the pre-assessment and post-assessment we observed that all four educators who took part in both assessments improved from the pre to post-assessment. **Figure 3** below shows the results of each of the four educators. From this information, we were able to understand that we needed to focus on presenting information rather than how to implement the information. We decided to focus on putting this information on pedagogy into the lesson plan rather than the actual module.

**FIGURE 3: PRE AND POST BIODIVERSITY MODULE ASSESSMENT RESULTS.** ABOVE ARE THE RESULTS BY EDUCATOR OF THE PRE AND POST ASSESSMENTS OF THE BIODIVERSITY MODULE. NOTE THAT THE HIGHEST SCORE IS 7 AND THAT ONLY ONE EDUCATOR HAD FULL MARKS.

4.2 ADDITIONAL INFORMATION TO AID IN BUILDING THE SUSTAINABILITY MODULE

To create the module, our team needed to gain insight, inspiration, and guidelines on how to create the module. We spoke to members of NaDEET to better understand the structure of the module. We also went to a Namibian secondary school to observe student-to-teacher interactions to understand how to present our module in the NaDEET teacher workshop.

4.2.1 INFORMATION SESSION WITH NADEET
To gather insight into the Sustainability module, our team scheduled an information session with Viktoria Keding (the director of NaDEET) to go through the Sustainability Module Outline (Appendix F) that NaDEET had provided to us prior to our departure to Namibia. This meeting took place in Swakopmund, Namibia in NaDEET’s Urban Sustainability Center and those in attendance were Mrs. Keding, Mr. Haindongo, the four team members, and our sponsor Mr. Kaapehi. The objectives of this meeting were to identify the expected audience for the module, to define the subtopics of the Sustainability Module, and to gather documentation of the activities expected to accompany the lesson plans our team will leave behind.

The previous Biodiversity workshop had educators as its only audience; however, we learned that the Sustainability Module has two key audience categories: teachers and students. While teachers remained the primary factor in mind for the building of the Sustainability Module, the diverse audience range is since NaDEET aims to turn its center into an interactive museum open to the public. Mrs. Keding noted that her organization invites three to four educator groups per year, but a new initiative is to schedule Namibian schools to visit.

The second objective of this meeting was to go over the Sustainability Module Outline in Appendix F so that all team members understood the content expected to be included in the outline. The NaDEET staff members went through each topic individually and described briefly how each subtopic pertained to one of the pillars of sustainability (which are social, economic, and environmental). Mrs. Keding specifically described Topic 2, Energy (Household & Transport), and Topic 4 (Waste), as one of the more important topics in the module.

Even before our team’s departure to Namibia, our sponsor EduVentures asked many times for more visual content and activities to be involved in the Sustainability Module. Initially, when given the Sustainability Module Outline, NaDEET provided limited information about the activities attached to the outline. This was one issue we addressed during the information meeting. After questioning Mrs. Keding about the content of the activities, our team learned that all activities were already created by NaDEET and we were able to request all online documents related to the activities.

4.2.2 SECONDARY SCHOOL OBSERVATIONS
We traveled to Delta Secondary School, in Windhoek, Namibia, to observe teacher-to-student interactions in a classroom setting. The goal of these observations was to gain a better understanding of what presentation and teacher style worked best in Namibian classrooms. This assisted us on how to present our Sustainability module and how to formulate the lesson plan. We observed three classrooms: a tenth-grade physics class, an eleventh-grade biology class, and an eleventh-grade chemistry class.

During the observation of the tenth-grade physics class, multiple teacher-to-student interactions were observed. The teacher was going over the answers to an exam that the students had previously taken. To do this, the teacher used the whiteboard to provide visual explanations for questions that the students had and to explain how to formulate the correct answer on the exam. The teacher also often referred to the exam and pointed to certain portions of it to aid in explanations to the students.

The observation of the Physics class showed that visuals were heavily used when explaining the topic at hand. This allowed us to infer that visuals worked best to engage students and allowed the learners to retain the information being presented. In our Sustainability module, we decided to incorporate this strategy to provide valuable information in an engaging way. We attempted to use icons and pictures when explaining information rather than just simply incorporating words.

During the eleventh-grade biology laboratory class observation, teacher-to-student interactions were observed. The teacher asked for the students who were ready to enter the lab and those who were not to take a moment to get ready before entering. She expected the students to have done their research on the previously distributed worksheet and know the material beforehand. At the beginning of the lab session, she poured the chemicals for their experiments herself. As the lab sessions continued and towards the end, the teacher allowed the students to do most of the pouring themselves and gauged the situation. The teacher also kept track of time on the board. She listed the time of the period in five-minute intervals and crossed out the times as the end approached.

The students worked in groups to complete the experiment. Much of the student to student interaction included casual conversations, discussion about the assignment given to them, as well as conversations with other groups. These conversations were often clarification on proper lab technique, where to start on the worksheet or conversation that didn’t pertain to the class at all. Most students generally seemed confused and frantic to complete the assignment.
Leaving the student with a worksheet to work alone did not seem to aid the students in grasping the concepts that the teacher was trying to convey. We used the information from this observation to make sure that we avoid delivering activities with worksheets that had too many words. We also learned that it would be effective to do group activities. The students were able to assist each other to complete the assignment in the given time.

Lastly, during the eleventh-grade chemistry class observation, another teacher-to-student interaction was observed. In this class, the teacher started by reminding the class of the topics from the previous class. The teacher asked her students multiple questions on the topic she was teaching and they responded well as the classroom was very communicative. When there were students who were not actively listening in the classroom, she addressed this by asking them questions and engaging them. The teacher allowed a platform for students to do research and discuss outside but related topics. Additionally, when questions she couldn’t answer came up, she was very willing to do outside research and help them understand as well. The teacher also repeated the phrase “Knowledge is Power” to the classroom several times.

During the chemistry class, the students sat at their individual desks. They all had their textbooks and notebooks out. As the teacher lectured, many students were not afraid to respond back to the teacher with clarifying questions and they often provided their own insight on the topics covered.

We incorporated the open-ended structure of the chemistry class into our lesson plans for the workshop that NaDEET will be hosting. We found that the way this class was organized left the students engaged and active. From this observation, we thought adding discussion and debates would also give the same impact and leave educators engaged.

4.3 DELIVERABLES

There are 3 major deliverables that our team produced for the EduLink project. These were tasked to us by NaDEET and EduVentures to ensure the success of the Sustainability Module after our departure from Windhoek, Namibia. These deliverables included: The Sustainability module, the lesson toolkit, and the pre and post assessment. The purpose of these deliverables was not only
to prepare for the teacher workshop hosted by NaDEET, but also to be used at other centers associated with EduVentures and the EduLink project.

4.3.1 THE SUSTAINABILITY MODULE

The content outline provided by NaDEET included five topics pertaining to living a Namibian sustainable lifestyle. These topics included: Education for Sustainable Development (ESD), Energy in Namibia, Healthy and Sustainable Living, Waste, and How to be a Global Citizen. Within each topic there were three to five subtopics that focused on different aspects of the main topic.

The first topic, as mentioned above was on “Sustainable Development & Education for Sustainable Development (ESD)”. The first subtopic went over the definition of sustainable development and gave an overview of this using the video “The World’s Largest Lesson” which was created by The Global Goals organization. It included a timeline on the development of the concept of sustainable development on both a global and Namibian perspective. The next subtopic did an overview of the UN’s 17 sustainable development goals followed by a section that covered education for sustainable development and included an established game by NaDEET to follow.

Topic two was on “Energy (Household & Transport)”. The first subtopic answered the question what energy is and gave examples of how much energy is consumed in a Namibian lifestyle. The second topic focused on energy accessibility and how it affects rural vs. urban Namibia. The third subtopic highlighted what sources of energy Namibia uses and Namibia’s involvement in renewable energy as seen in Figure 4. The fourth subtopic explained the consequences of non-renewable energy on the environment, education and health of Namibian residents. The fifth subtopic concluded with actions that can be done by teachers to transition their school into an energy efficient environment.
The third topic was on “Health and Sustainable Living”. This subtopic was more focused on the social aspects of sustainability and how you can change your lifestyle. The first subtopic went over inequality in Namibia and rising consumerism in Namibia. The next subtopic was on sustainable development and how it relates to health. The topic preceding that went over healthy eating and staying fit. It went into detail about how the human body uses food as energy. This topic concluded with a section on water consumption and use. This subtopic provided statistics on water consumption, recommendations for water use and a few activities for educators to use in their lessons.
FIGURE 5: WAYS TO EAT SUSTAINABLY. THE IMAGE ABOVE DISPLAYS DIFFERENT WAYS TO EAT SUSTAINABLY IN WHICH EACH WAY WILL GO INTO GREATER DETAIL ON A DIFFERENT PAGE.

Topic four focused on waste and began with a subtopic on global waste and local Namibian waste. The next subtopic provided a solution to the global and local waste which is to reduce, reuse and recycle. To finalize this topic, there was a lesson on waste management at Namibian schools and in communities. Again, additional activities were provided for the educator to use in the classroom.

The last topic was complementary to the first topic. It gave a summary of everything learned and gave the user the opportunity to reflect upon the first subtopic: “Starting with ‘me’ - what can I do”. This section gave recommendations on how the user could live a sustainable lifestyle. The second subtopic was on “The Importance of Nature” and “The Importance of Nature to Namibia” which linked the human world to nature. The last subtopic of the module went over the “Good Life Goals.” There are 17 good life goals that correspond with the 17 sustainable development goals.

4.3.2 SUSTAINABILITY MODULE LESSON TOOLKIT

In addition to the Sustainability Module, our team developed a toolkit for educators to use. The toolkit included lesson plans for each topic, a suggested workshop itinerary for each day of the workshop, as well as additional activities and worksheets to be completed throughout the workshop.
The purpose of this toolkit is not only to provide supplementary materials for teachers who attended the workshop, but also to provide detailed instructions for teachers who could not attend the workshop.

Each section of the lesson toolkit began with a suggested timeline for each topic which is intended for the teacher workshop. There is a screenshot of each page of the module in the lesson toolkit. The lesson toolkit gives user guidelines, such as a pointer finger icon, that indicate where to click on the module as shown in the figure below.

![Image of lesson toolkit screenshot](image)

**FIGURE 6: LESSON TOOLKIT SCREENSHOT.** THE IMAGE ABOVE SHOWS AN EXAMPLE OF THE WASTE TABLE OF CONTENTS.

The screenshots are paired with written instructions. Additional contextual information is given to each slide. This allows the educator to say this additional information verbally rather than it being shown on the screen. There are also suggested activities for each topic. The user guidelines are directions that help the user navigate through the module.

### 4.3.4 PRE AND POST ASSESSMENT

The pre-assessment contains 25 questions, which were created based on the lessons covered in the module. The assessment will be used in the workshop to test the baseline knowledge of the educators prior to the Sustainability workshop. The post-assessment contained the same questions as the pre-assessment and is intended to understand what knowledge was retained from the module during the workshop. These assessments can be used to gauge the success of the module in the
workshop. Additionally, the assessment results can be crucial feedback for building the fifth and last Edulink project: Community Based Natural Resource Management (CBNRM) module.

4.4 FEEDBACK ON THE SUSTAINABILITY MODULE

Before completing our module, we needed to gain feedback on the current module regarding both the content and the structure. We presented our module to both EduVentures and NaDEET staff in a total of four feedback sessions. The EduVentures staff gave the feedback focusing on structure of the module, whereas, NaDEET provided feedback on both the content and structure. We were able to present to NaDEET on April 8th so that we could implement their original suggestions before presenting a second time on April 12th. The feedback we received allowed us to continuously improve our module.

4.4.1 FEEDBACK FROM EDUVENTURES

Prior to receiving feedback from NaDEET, we received feedback from the staff at EduVentures on our module. We spent approximately 30 minutes going through each topic. Staff members told us that in general, we should reduce wording on the pages more, and should avoid pages that scroll because of SMART boards, the instruments where the modules would be presented on, were not meant to have pages that scroll. They suggested that the module should be organized in a way so that it tells a story. Initially, our module had a different theme for each subtopic. The staff members of EduVentures suggested that there should be a similar visual theme for each topic rather than each subtopic. This would make the module more uniform and less confusing. We spent a couple of days making these edits so that we would be more prepared for our feedback from NaDEET.

4.4.2 FEEDBACK FROM NADEET

We spent two sessions receiving feedback from NaDEET within a single week timespan. This gave us time to make edits to our module before receiving feedback again. During the first session, we spent approximately an hour on each topic. Mrs. Keding suggested that we add more
Namibian specific events to our timeline on sustainable development. She also gave us a better idea about how to execute the Sustainable Development Game.

For the second topic on sustainable energy, Mrs. Keding suggested changing the order of the presentation for the subtopics, so that it is easier to follow along. There was a section on sustainable use of household energy. For that section, Mrs. Keding suggested using appliances specific to Namibia in both rural and urban areas. Since all the educators who were participating in the workshop would be coming from different areas of Namibia and had varying levels of education, she suggested that we include a video that gave an overview of what energy was.

The first recommendation that Mrs. Keding gave on the third topic was to change the title from Consumption & Responsible Consumerism to Healthy and Sustainable Living. This title is easier to understand and relate to. She also wanted us to put a greater emphasis on how rising consumerism has increasingly hurt the environment. Mrs. Keding noted that many of the pages on this topic were pitched towards the wrong audience. The module will be used in the teacher training workshop and should be targeted at the teachers’ comprehension level. All attendees teach the secondary grade level. She also recommended a water meter activity that would show the impact of not using water properly. Lastly, Mrs. Keding requested that all pictures of food shown in this topic should be from Namibia.

On the topic of waste, Mrs. Keding encouraged us to make the global waste crisis section as dramatic as possible. She suggested making it more emotional by showing pictures of piles of waste in various third world countries. Concerning Namibia’s specific case, Mrs. Keding explained to us that there were very few recycling centers in Namibia and this needed emphasis in the module. Lastly, she wanted us to add clean-up campaigns in Namibia and their impact.

For the last topic, Mrs. Keding emphasized that this topic should be a summary of all of the previous topics. Similarly to the third topic, she noted that this section was created for the wrong age group. The last feedback that we received from Mrs. Keding was that she wanted to make sure we included the importance of living as part of the natural ecosystem that supplies the resources for life in Namibia. That concluded the first feedback session with NaDEET and we spent the middle of the week editing the module.
At the end of the week, we presented to staff members of NaDEET once again. They were very pleased by the changes made, but still had further new comments to make. For the topic on sustainable development and education for sustainable development, the NaDEET representatives recommended changing some of the videos to ones that would better reflect the sustainable development goals. For the “Energy: Household and Transport” topic, the appliances that we gave as examples mostly showed ones that are used in urban Namibian households; Mrs.Keding gave a few suggestions as to what could be used to better communicate with rural households. Comments on the “Healthy and Sustainable Lifestyle” topic included ways to better represent tips on how to eat sustainably. Mrs. Keding suggested creating a map that displayed the location of all the recycling centers in Namibia for the “Waste” topic. Due to time constraint, we were not able to receive much feedback on the last topic titled “Taking Action for Global Citizenship” other than to restructure the order.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

The purpose of our project was to create and implement an online module that focused on sustainability in Namibia. This is important because there is a lack of sustainability education in the Namibian curriculum. Our module will be used by educators to teach classroom instructors content to implement sustainability into their lesson plans. The module is one in a series of modules created for our sponsor EduVentures’ EduLink project. These modules will be used to bridge the gap of Education for Sustainable Development (ESD) in Namibia.

5.1 THE USE OF ONLINE MODULES FOR ESD
Online learning is seen as an effective way to educate about ESD topics in Namibia (Levy, 2007). The EduLink project has incorporated teaching method into the Namibian curriculum by first educating classroom teachers about this subject and its learner-centered method.

The online modules provide the aspect of interactivity as well as creativity for each classroom that will use this method. Currently, most centers use methods such as posters and slides that provide similar content to the module that we have created. However, these methods limit the interactivity at the centers. Our module provides a way for the teachers to be engaged throughout the lesson through games, discussions, and hands-on activities.

The online modules are an effective way to educate classroom teachers on sustainability so that this same information can be introduced into the classroom. The training modules also allow the teachers to use ideas from the module in their own classroom. The capacity to personalize the modules we took care to preserve can allow teachers to use their choice of methods to create their own modules on different topics. The module can be used as an introduction to a specific topic without relying on a traditional teacher-centered classroom. The online modules allow the teacher’s role to become less of the focus and transfers that focus to each of the students. Many of the supplemental activities that were included in our module satisfy the need for the same result of shift in focus from the teacher to the student. The use of online learning not only allows this to happen, but also provides a creative and interactive outlet for the classroom.

5.2 RECOMMENDATIONS FOR FUTURE DEVELOPMENT OF THE EDULINK PROJECT

EduVentures’ EduLink project still has one more module to create on Community Based Natural Resource Management (CBNRM). We have provided some recommendations for the continuation of the EduLink project with the CBNRM module. These recommendations have been taken from our personal experience while working on the module and can be applied to both the next team tasked to create this module as well as EduVentures, who will be aiding and maintaining the progress and success of this module.
5.2.1 THE SOFTWARE TO CREATE THE MODULE

We recommend that the team tasked with creating the Community Based Natural Resource Management (CBNRM) module also use SMART Notebook in order to keep most of the software consistent between the four total ESD modules. In order to get the most out of SMART Notebook, we suggest the use of the activities that are provided by SMART Notebook and making them relevant to each specific topic. SMART Notebook’s suggested activities increase the interactivity of users and they allow for a break in between the lessons. SMART Notebook also does not need internet access to function, which makes it effective because there is no reliable internet at many of the ESD centers. The lack of need for an internet connection allows the module to be accessible anywhere including remote areas.

If the team does decide to use SMART Notebook as the software or any software that they choose, we recommend that they do extensive research on how to use the software before they arrive in Namibia. Before creating our module, we needed to learn all the features of SMART Notebook. If the next team participating in the EduLink project familiarized themselves with the software before the official start of IQP, it would give them additional time to work on and polish the module. It does take some time to learn any software and it would allow the team to know if that is the best software for their specific part of the EduLink project before arriving in Namibia.

After speaking with EduVentures post-arrival in Namibia, we learned that our project was slightly different from the prior EduLink Biodiversity module. For the Sustainability module, each educator attending the workshop will not have a computer screen in front of them unlike the Biodiversity module, so this is why SMART Notebook was the best choice for this specific module, but this may not hold true for all portions of the EduLink project.

5.2.2 INCLUSION OF SUPPLEMENTAL ACTIVITIES

We attempted to include many additional activities in our module and suggest that the CBNRM module include additional activities, as well. Much of the feedback we received, it was clear that many of the educators found supplemental excursions and activities were welcomed and encouraged. Many found additional resources helpful in the whole educational experience of the workshop. The additional aspects were anything from worksheets to debates and discussions. We found that many of the activities could be implemented into the beginning, middle, or end of a
subtopic. Many of the activities were great introductions to a topic and allow the educators to learn about a subtopic before it is even taught on the SMART Board.

5.2.3 PROGRESSION AND REVISIONS OF THE MODULE

The content outline for our module was given to us by NaDEET; however, we established the topic content and restructured the subtopic outline to work with the flow of each topic. We learned in a late stage of our project that the flow of each topic was difficult to follow because we were following the provided outline too closely. We suggest that with the next outline the team should create their own revised outline of each topic to go over specific subject flow before creating the next module. The flow was something that we had to work a lot on at the end of our project, but if these outlines were created early on and reviewed by the sponsors it would have saved time, allowing for a higher quality module earlier in the process.

As previously mentioned, we had a third party who created the outline for the Sustainability module. We were only able to meet with this party, NaDEET, twice. The first time we met was during the first week of our project and the second was during the fourth week into our project after finishing our first draft of the module. We found that a lot of changes needed to be made in the Sustainability module from the fourth week of our project to the end. Due to this experience, we recommend that the next team have more scheduled meetings with the person or organization who created the content outline for the module. This could be as simple as weekly Skype meetings if they are not accessible geographically. NaDEET was very familiar with the structure of the outline and how they envisioned it. Therefore, a weekly or biweekly meeting with the outline creator will allow the team to have a better understanding of the content outline, discuss the progress, and fix arising problems immediately.

We gained a lot of great ideas our feedback sessions with both EduVentures and NaDEET. The problem that we encountered was that some of the feedback we received required a lot of work to be put in to make the changes to these suggestions. All our feedback sessions were held when the project term was coming to an end. Therefore, we felt as though we were rushed to make all the changes that needed to be made while maintaining quality work.

Due to this, we recommend that each time a subtopic is complete in a module it is reviewed by EduVentures, who will provide feedback on the current progress. This will allow changes to be made promptly and any feedback that is received toward the end of the term will be small changes
that can easily be made within the allotted time. This will also allow the next team to be aware if they are missing any content that was expected of them. These meetings should be more focused on the structure and content of the module rather than the overall aesthetic of the module.

### 5.2.4 IMPLEMENTATION OF THE MODULE

The workshop for the Sustainability module is, unfortunately, being held when we are no longer in Namibia. We will be unable to observe the teachers during the workshop to determine the effectiveness of our module in both user engagement and retention. This leaves a critical portion of our project uncertain because we are unable to learn about the implementation of our module. This would have been a great way to not only gain this information, but also to find out how the module could be improved on for the future. We would have been able to get responses from teachers while they were going through the workshop and would also enable face to face interaction with the teachers using it.

For this reason, we recommend that EduVentures plan the workshop for the next module during the time that the next WPI team will be in Namibia. This will allow EduVentures to gain a plethora of information regarding their module and be available to the teachers attending the workshop for any confusion that may arise during the workshop. By attending the workshop, the next team will be able to complete a large portion of the project which is the real-life implementation of the module. This will not only help them examine the effectiveness of their module, but also aid EduVentures’ future collaborators and their staff in the completion of the EduLink project.

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Traditionally, EduVentures main activities have been expeditions with school learners and students to Namibian remote areas to collect biological specimens for the National Museum of Namibia, National Botanical Research Institute and other scientific and education centers. In this activity, participants were accompanied by scientist, teachers and experts in various fields; this exposes learners to various environmental issues of significance to the Namibian context such as the lack of biological data on species distribution, climate change impacts and the significance of Environmental Impacts Assessment to ensure sustainable utilization.

In 2013, EduVentures launched the Ombombo Mobile Classroom. Referred to as the EduMobile project, the mobile classroom broadened our services to target Namibia rural schools and communities, hence the lack of experience-based education due to lack of facilities and isolation of these areas. The aim of this project is to supplement the Namibian Education system with a hands-on experiential learning on theoretical topics covered in the Namibian school curriculum. EduVentures has collaborated with WPI since 2009 with a total of 20 students participated.

After the experience of the EduMobile project, EduVentures is currently working on the EduLink project. The aim of this project is to equip teachers with pedagogical content knowledge, so as to enable cross-curricular teaching of ESD through hands-on learning using real life examples. The project proposes an educational model for strengthening the implementation of EE/ESD in schools in Namibia. The model is based on the principle of a multiplier effect by advocating three tiers of training, namely ESD Educator training, teacher training, and primary and secondary school learner education. EduLink satisfies all five Priority Action Areas as set out in the recently launched Roadmap for Implementing the Global Action Programme (GAP) on Education for Sustainable Development of UNESCO. The model itself is neither target nor discipline specific; it can be adapted for different countries and needs.

**Project description**

The here proposed ESD Network model focuses on developing teacher skills. The model focuses on the training for ESD Educators, who in turn train teachers. Strategically located ESD Centres will be established country wide. These will serve as centres of excellence for knowledge transfer and capacity building. At each ESD Centre a ‘smart classroom’ will be developed to serve as a nucleus where ESD Educators and teachers are trained in, and contribute towards, EE/ESD concepts and training techniques.
ESD Centres will be connected to each other, and to an e-tutor group to form a web-based learning environment, or virtual classroom. Such an e-learning platform will allow participants to work through web-based training modules at their own pace, while the virtual classroom environment will facilitate interaction between the participants (e.g., discussion of ideas, reciprocal assistance), and between the participants and the e-tutors. This can be done through, for example, an interactive whiteboard, text-chat, audio- or video conferencing, discussion forums, and resource and application sharing.

In addition, a group of students from WPI has set up a Learning Management System using Google Classroom. The second group in August developed one module on Biodiversity. However, as per project indicator, there is a need to develop three more modules. Therefore, the present request is for students to develop three modules to be used to train educators at EE centers. From previous group that developed the Biodiversity module, it was clear that we need two groups of students to work on developing the last three modules. Therefore, the students will work closely with NaDEET center to develop the Sustainability module and the Ministry of Fisheries center to develop the ocean literacy module. The third module is EduVentures responsibility and students will work with EduVentures on this module. We are therefore requesting 8 students to work on the three modules.

These modules should be Namibia specific and linked to the National School Curriculum so as to target the implementation of ESD in the schools. These same modules will be used by educators to transfer knowledge to teachers. Furthermore, Namibia has a lot of literature and educational materials available. However, most of the materials are not harmonised with the school curriculum and are repetitive at times. Therefore, it is necessary to use these materials and harmonise them with the school curriculum.

**Didactic course design of WBT**

Learning unit and knowledge unit of direct services

**Some of the educational materials that exist in Namibia**

**Project Objectives**

Primary objective for both teams:

1. Develop two WBT modules to be used to give instructions to educators at EE centers which have to transfer to teachers when they are training teachers.

Supporting objectives for two separate teams:

1. Assist in determining content for modules to be developed.

2. Develop WBT modules (Sustainability and Ocean Literacy) as guidelines for related SMART lessons.

3. One team will work on Ocean Literacy and the other team will focus on Sustainability. Both teams will contribute to developing materials on Community Based Natural Resource Management.

4. Upload the course modules on the e-learning platform developed by the A18 WPI project group.

**Project outputs**

1. Content for the project
   
   - What to teach the Educators?
   - What existing information can be used?
   - Content should be Namibia specific (Usage of local examples)
2. Collection of resources for educators / teachers (didactic methods, pedagogical tools and in class activities)

3. Development of course modules and SMART lessons for the e-learning platform on the assigned topics.

**Skills required from the student**
Extensive computer skills including software programs such as Smart notebook, Adobe captivate and more.

1. Extensive skills on environmental issues such as biodiversity functioning, sustainability science, climate change and Renewable Energy.
2. Knowledge about teaching practices, organizational methods and didactic methodologies
3. Creative designing and artistic skills.
4. Ability to work in a team, adaptability and willing to work extra hours.
5. Respect for cultures and humanity

**APPENDIX B: SURVEY TO EDUCATORS**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you enjoy the Biodiversity module?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Why did you enjoy or not enjoy the Biodiversity module?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Were the lessons presented to you in an engaging way?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Rating Options</td>
<td></td>
</tr>
<tr>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td></td>
</tr>
<tr>
<td>Introductory video</td>
<td>1 2 3 4 5</td>
<td></td>
</tr>
<tr>
<td>Notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedagogy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessments</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did you enjoy the outdoor excursion to look at different plants and animals? Why or why not?

Did you enjoy the guest speaker during the workshop? Why or why not?

Did you enjoy the debate? Why or why not?

How suitable were the games used to present content? (1-Too simple, 2-Somewhat simple, 3-No opinion, 4-Somewhat complicated, 5-Too complicated)

<table>
<thead>
<tr>
<th>Rating Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>
What would you change or add to the module? Do you have any recommendations for future modules?

Table 1: Survey questions for EduVentures educators

Did you enjoy the guest speaker during the workshop? Why or why not?
7 responses

<table>
<thead>
<tr>
<th>I enjoyed the guest speaker, he spoke clearly and well understandable of what he spoke about Biodiversity.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, they were informative and knew the facts</td>
</tr>
<tr>
<td>Yes, learnt more about fisheries</td>
</tr>
<tr>
<td>Yes, having environmental education at heart</td>
</tr>
<tr>
<td>The speech was relevant to the topic of interest</td>
</tr>
<tr>
<td>I enjoyed the guest team from the fisheries ministry because they really gave insight to the challenges faced in managing our biodiversity resources.</td>
</tr>
</tbody>
</table>

Did you enjoy the Biodiversity module?
8 responses

- Yes: 87.5%
- No: 12.5%
- It was ok: 0%

67
### Did you enjoy the debate? Why or why not?

8 responses

<table>
<thead>
<tr>
<th>Response</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes, i enjoyed the debate , because everyone was actively involved and worked as a team.</td>
<td></td>
</tr>
<tr>
<td>Yes, it was fun and new info not known before came forth</td>
<td></td>
</tr>
<tr>
<td>yes, it allowed participants to think outside the box and be able to defend their points.</td>
<td></td>
</tr>
<tr>
<td>Yes .we learned a lot from the debate</td>
<td></td>
</tr>
<tr>
<td>People kept on repeating the same point</td>
<td></td>
</tr>
<tr>
<td>oh yes. the debate was a real refresher and mind tester. the fact that the teams were randomly selected to defend their motions was incredible, this was a way of encouraging teamwork where everybody had a role to play, the debate was a platform to see how much we have learned and understood during the module lessons.</td>
<td></td>
</tr>
<tr>
<td>yes, but the preparation was ad hoc and really didn't bring out the best out of the participants.</td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td></td>
</tr>
</tbody>
</table>

### Why or why not did you enjoy the Biodiversity module?

8 responses

<table>
<thead>
<tr>
<th>Response</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>I enjoyed it, whereas i learnt more of the Ecosystem terminologies, e.g. Plants and Animal Classifications, their habitats, adaptations,etc.</td>
<td></td>
</tr>
<tr>
<td>The module had relevant information and interactive games</td>
<td></td>
</tr>
<tr>
<td>It was not really new information.</td>
<td></td>
</tr>
<tr>
<td>Enjoy it because it was straight to point and understandable</td>
<td></td>
</tr>
<tr>
<td>It covers so much content on biology, and I have a passion for nature</td>
<td></td>
</tr>
<tr>
<td>I liked the whole concept of including games, and little questions and in depth explanations on certain topics, of course more local examples would make sense but the structure of the module is so far a great idea to engage all learners and teachers inside the classroom and in the field.</td>
<td></td>
</tr>
<tr>
<td>I like the concept and design of the module but the execution was impaired by other factors.</td>
<td></td>
</tr>
<tr>
<td>more informative</td>
<td></td>
</tr>
</tbody>
</table>
Were the lessons presented to you in an engaging way?

8 responses

- Yes: 87.5%
- No: 12.5%
Please rate each section of the Biodiversity module.

(Less Helpful)  2  3  4  5 (More Helpful)

introductory Video  Notes  Games  Pedagogy  Assessments

Did you enjoy the guest speaker during the workshop? Why or why not?

7 responses

- I enjoyed the guest speaker, he spoke clearly and well understandable of what he spoke about Biodiversity.
- Yes, they were informative and knew the facts
- Yes, learnt more about fisheries
- Yes, having environmental education at heart
- The speech was relevant to the topic of interest
- I enjoyed the guest team from the fisheries ministry because they really gave insight to the challenges faced in managing our biodiversity resources.
- yes
Did you enjoy the outdoor excursion to look at different plants and animals? Why or why not?

8 responses

Yes, it was an enjoyable activity, whereby, the group was exposed on how do plants loses water. A good practical that was carried out was to tie plastics bags on two-three different trees, i.e. the tree with broad leaf, the one with narrow leaves and the dry tree. These plastic bags were tied on the trees for the whole night and the following day, we only collected the plastic bags of each tree to evaluate which the three trees have more stomatas (released more water than the others). Finally, the tree with broader leaves releases more water than the rest and the dry tree could not even put a drop in a plastic bag. This activity was carried out in Rundu (Maria Mwengere Resource Centre), by: Corris Kaapehi- EduVenture Project Manager.

Yes, it was fun and could remember what was said and done in the field

Yes, it i could learn about some new plants and animals in a different habit

Enjoyed .it was more educational

Learning hands on is always the best

I feel it could have been better. I expected to see more and learn more about the animals or organisms that live in those areas and how they interact with the plants and with each other. Plus we were probably not mentally prepared as we had to be in terms of what to look at hence we did not really engage much.

Yes the excursions revealed the importance of ecosystem services of the different organisms.

yes
### Did you enjoy the debate? Why or why not?

8 responses

- yes, I enjoyed the debate, because everyone was actively involved and worked as a team.
- Yes, it was fun and new info not known before came forth.
- Yes, it allowed participants to think outside the box and be able to defend their points.
- Yes. We learned a lot from the debate.
- People kept on repeating the same point.
- Oh yes, the debate was a real refresher and mind tester. The fact that the teams were randomly selected to defend their motions was incredible. This was a way of encouraging teamwork where everybody had a role to play. The debate was a platform to see how much we have learned and understood during the module lessons.
- Yes, but the preparation was ad hoc and really didn't bring out the best out of the participants.
- Yes.

### How suitable were the games used to present content?

8 responses

![Bar chart showing the suitability of games used to present content.]

- 1 (12.5%)
- 2 (0%)
- 3 (37.5%)
- 4 (50%)
- 5 (0%)
What would you change or add to the module? Do you have any recommendations for future modules?

8 responses

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nothing to change or add. In future, the project should create more practical activities, assign Environmental Educators to work them out, this will help Educators to be more productive and actively work with school teachers within their regions (Awareness Programs).</td>
</tr>
<tr>
<td>Reduce wording and make it more interactive, more practical hands on activities and less computer based activities or at least alternatives for those who don't have access to computers especially with game etc.</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Not yet I need time to grasp it still</td>
</tr>
<tr>
<td>the only thing we could look into is include more Namibian examples that we can relate to and probably more games. For future recommendations I suggest we consider inviting 1 or 2 qualified teachers, module developers or Regional Education officers. Because as much as we will be educating the teachers, the teachers are still the ones that will be directly engaging with the learners in the classrooms they know how the systems work so having them on board would give us an idea on where or how to improve.</td>
</tr>
<tr>
<td>Time management and the whole set-up was something that could really use some improvement.</td>
</tr>
<tr>
<td>add all ESD Centres</td>
</tr>
</tbody>
</table>
APPENDIX C:

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your overall first impression of the module?</td>
<td>Overall, the module was good. It had a lot of good information about Biodiversity.</td>
</tr>
<tr>
<td>What do you like and not like about the module?</td>
<td>I liked the games and the activities that were incorporated in the module. I did not like how much text was in the note section. It was informative, but it was boring to read through.</td>
</tr>
<tr>
<td>What would you like to see added to make the module better?</td>
<td>I want the module to be more creative. There were few pictures. The topic of biodiversity can have so much more visuals.</td>
</tr>
<tr>
<td>Do you feel it is easy to navigate through and if not, why?</td>
<td>Yes, the module was very easy to navigate through. It was split up into different sections and each section had its own sub-sections that could be clicked on.</td>
</tr>
<tr>
<td>Do you feel you learned something from this module?</td>
<td>Yes, a lot of the information of biodiversity that was given from the module was new information for me.</td>
</tr>
</tbody>
</table>

Table 2: Interview topics for ESD educators while using the modules

Interview responses from Pandu Haindongo:

Question: What is your overall first impression of the module?
Response: Overall, the module was good. It had a lot of good information about Biodiversity.

Question: What do you like and not like about the module?
Response: I liked the games and the activities that were incorporated in the module. I did not like how much text was in the note section. It was informative, but it was boring to read through.

Question: What would you like to see added to make the module better?
Response: I want the module to be more creative. There were few pictures. The topic of biodiversity can have so much more visuals.

Question: Do you feel it is easy to navigate through and if not, why?
Response: Yes, the module was very easy to navigate through. It was split up into different sections and each section had its own sub-sections that could be clicked on.

Question: Do you feel you learned something from this module?
Response: Yes, a lot of the information of biodiversity that was given from the module was new information for me.
Figure 1: Overall score out of forty for each section of the Biodiversity module
Figure 2: Average rating of each section of the Biodiversity module

APPENDIX E: RESULT FROM THE PRE AND POST ASSESSMENTS OF THE BIODIVERSITY MODULE
### EduLink Project - Sustainability Module Outline

**Prepared by Viktoria Keding, NaDEET - v.keding@nadeet.org 081 277 9309**

The sustainability module aims to empower teachers with knowledge and skills to teach about living a more sustainable lifestyle in a Namibian context. The module is divided into the introduction topic of sustainable development, the three core themes of energy, consumption & responsible consumerism, and waste and the overarching theme of global citizenship. It is highly recommended that the SD & ESD lessons presented here are utilised in every EduLink module to ensure that all learners have a solid foundation in ESD before engaging in the specific topic.

#### Key Theme

<table>
<thead>
<tr>
<th>Topic</th>
<th>Sub-topics</th>
<th>Links to Curriculum</th>
<th>Practical Activity Ideas</th>
<th>Literature Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable Development &amp; Education for Sustainable Development (ESD)</td>
<td>1. What is SD? Including definitions and history 2. What is ESD? (SDGs) 3. SDGs and related targets</td>
<td>Purple highlight</td>
<td>1. Video on SDGs from World’s Largest Lesson 2. SDG Game developed by NaDEET - explores the challenges and actions related to SDGs</td>
<td>• UNESCO website - ESD section (videos &amp; report books)  • World’s Largest Lesson website  • Globalgoals.org  • Namibian National Household &amp; Expenditure Survey</td>
</tr>
<tr>
<td>Consumption &amp; Responsible Consumerism (including healthy eating &amp; water)</td>
<td>1. Inequality in Namibia &amp; rising consumerism 2. Impact on SD in terms of health 3. Healthy Eating &amp; Staying Fit 4. Wise Water Use</td>
<td>Blue highlight</td>
<td>1. Shop Till U Drop Game 2. Nutrition Games 3. Learning to read labels</td>
<td>• Think Namibia (National Institute for Democracy)  • Legal Assistance Centre  • Permaculture Namibia</td>
</tr>
</tbody>
</table>

---

**EduLink Project - Sustainability Module Outline**

**Prepared by Viktoria Keding, NaDEET - v.keding@nadeet.org 081 277 9309**

1. Reduce, Reuse, Recycle
2. Waste management at schools & in our communities

### Taking Action for Global Citizenship Using a Sustainable Lifestyle

1. Starting with “me” - what can I do? 2. Community of life (linking our human world to nature) 3. Good Life Goals

### Pink highlight

1. Eco-Handprint = 5 simple action 2. Building a Sustainable Community 3. Good Life Goals

- [www.naco.org.na/sustainability](http://www.naco.org.na/sustainability)
- [Government Policies on Sustainable Development in Namibia](http://www.naco.org.na/sustainability)
Grade 10 Physics:

Student-Student Interactions
- Students reminding each other to quiet down or study for future exams
- Self-sufficient, calculates own average
- Students often ask one another questions about the exam; classroom environment encourages peer learning
- Many students needed assistance when reviewing past material
- Students give mostly verbal positive feedback
- Centered at a “learn if you care” vibe

Teacher-Student Interactions
- When he wants them to be quiet he waits silently
- Tells them he is disappointed in them compared to other physics class
- Explains that students are not focused
- They can pick class, but he wonders if they were forced to take it
- Hands test back to students to go over answers
- Almost must yell to talk over students
- Often shushes the students to get them to quiet down
- Goes through every question on the test and the correct answer
- Answers any question the student had about test
- Engages students by asking for the answer to each question rather than just going through them
- Explains why answers are incorrect rather than saying they are wrong
- Refers to syllabus of grade 10 for questions
- Draws graphs and explanations on whiteboard to explain further
- Focuses on visuals (Had tests in front of students and board)
- Refers to visuals a lot
- Talks to specific students a lot if they have questions
- Often shows the test to students to explain questions
- Interacts with students in friendly terms but then serious

Grade 11 Biology:

Student-Student Interactions
- Students that knew what to do got to go into the lab while the other students had to stay in the classroom to do reading on the experiment before attempting the lab
- Students often chatter with each other when the teacher is not directly talking to them
- Students worked in groups to do experiments
  - Often, students would ask other groups for help
- Students often need guidance for proper lab technique
- Many students were confused and needed clarification from the teacher or often used their worksheet
- Some students didn’t even know where to start with the worksheet

Teacher-Student Interactions
- The teacher asked if the students were ready to visit the lab. She allowed the students who were ready and already read the worksheet handed out the previous week to proceed to the lab
The teacher was lenient and didn’t punish the students who were not ready to work in the lab. They were told to stay in the lecture until they were ready to proceed.

The teacher was gentle and helpful when the students presented her with questions. However, she expected the students to have done their research on the handed-out worksheets and know the material beforehand.

They had a very respectful teacher-student interaction.

At the beginning of the lab session: she knew their limits and she poured the chemicals for the experiments herself: however, she allowed some to do it themselves believing they can.

As the lab sessions continued and towards the end: she allowed the students to do most of the pouring themselves and gauge the situation.

The teacher also kept track of them on the board. She listed the time of the period in five-minute intervals and crossed out the times as the time approached. I believe this was to motivate the students to be more productive and time oriented.

**General observation:**

- Some students just came not knowing the entire experiment; however, she nicely told them to do the other experiment.
- The teacher mentioned she can’t spoon feed them everything. She truly believes they must try and fail and learn from their mistakes.

**Grade 11 Chemistry:**

**Student-Student Interactions**

- Students casually talked to the teacher
- They were calm and comfortable talking to the teacher
- The students were comfortable with raising hand to ask clarification questions as well as answering questions that the teacher asked
- The students would sometimes give their own insight on different aspects of what they were learning

**Teacher-Student Interactions**

- The teacher was constantly smiling. She was treating them with love and care (motherly)
- The teacher addressed her students as ‘sweetheart’ and had an “I care” board with the student’s birthday and photo in the room.
- It looks like the teacher had a personal relationship with her students.
- The teacher started with reminding them of the topics from the previous class
- The class room was very communicative. The teacher asked her students questions on the topic she was teaching, and they responded well. However, they were students not actively listening in the classroom. She (the teacher) addressed this by asking them questions
- She allowed a platform for students to do research and discuss outside but related topics such as string theory. When questions she couldn’t answer came up, she was very willing to do outside research and help them understand as well.
- The best part was when she kept telling the students that “Knowledge is Power”
APPENDIX H: NOTES FROM FEEDBACK SESSIONS WITH EDUVENTURES AND NADEET

Eduventures April 5\textsuperscript{th}, 2019

**Topic 1:**
- Change the Sustainability game to fit the module rather than using the module to fit the game
- Incorporate Namibian specific timeline events

**Topic 2:**
- Remove pixelated graphs as rural educators may not understand
- Clarify the difference between Energy and Electricity
- Remove climate change section completely

**Topic 3:**
- Include more examples of the oceans’ involvement with waste

**Topic 4:**
- Make more diagrams as opposed to more slides
- They liked the water droplets and want to incorporate more of it

**Topic 5:**
- N/A (incomplete now)

**Overall:**
- No Scrolling: disturbs the lesson
- Keep the color scheme the same within the topic but not necessarily between topics
- Use the same font and keep the number of slides below 30
- Take the time to be more creative as opposed to include more content

NaDEET April 9\textsuperscript{th}, 2019

**Topic 1:**
- Timeline activity: have a separate page on descriptions and then just pictures for actual activity
- More focused on Namibian context
- Draft EE policy, the establishment of ESA conference
- Maybe ten or twelve activities
- Introduction slide with information then worksheet so they can read different events
- Slide with details on not being new then Worksheet with details
- SDGs make words larger or make icon with wording or fade SDG to back
- Avoid directions: not needed
• SDG Game just print on and do not make it on game
• If not enough money to have all games printed
• Download videos because it is not possible
• Videos provided by NaDEET are already download
• Capitalizations and get rid of white boxes on comic and make it funnier…rather than just talking
• Make comic about what to do next and explain ESD look at examples of what teachers are already doing: gardens, photos of schools in Namibia
• Talk with Fernando
• Flushing out the timeline and make SDG presentation different
• Decade for Sustainable development
• Introductory slide on Sustainable development and ESD
• Definition of SD and then timeline and activity for a moment of time when they learned about the environment for them, sharing because it is the first day
• Make worksheets that go with the activity
• Conclude with ESD for 2030 and GAP (Global Action Program)
• 6 hours of teaching and learning time in town
• Lesson Plan activities
  o For pre-timeline activity, have the title of the conference or book, the date and the picture
  o  In the lesson plan, put the actual descriptions and worksheet
  o  For the actual timeline, have just the dates and pictures

Topic 2:
• First category should be energy in our household or in our transport
  o Windhoek Independence ave. pic
  o Energy in our household then this is what is going in a local Namibian house
• Then set scene with what is going on in Namibia today
• Rural household, urban household, show how Namibians are using energy daily--show diversity, cooking on fire and then smartphone
  o Urban house, rural house, Energy being burned
• Then talk about how we are powering it…. aka sources of energy
  o ACTION: Right away do a matching game with sources of energy because they should know how to do it
  o A section on why we need to use renewable resources
  o The zigzag page… See the Namibia flag… Matching game…. Namibian context
  o What we must change and why do we need to use renewable resources
  o ENERGY SOURCES: Rather than list countries show their outlines
  o ACTION: Add pictures in the pie chart..put a picture behind rather than just colors
• ASSESSMENT: Test sources in Namibian context
• Build up to and then go on to impact
• Remind people the consequences of open fire, deforestation, climate change
  o how each source causes climate change reminds people of all the impacts we use energy today: deforestation, lung cancer, change it to just the impact for if we do not change the energy story
  o https://vimeo.com/179763238
  o IMPACT: Potentially keep greenhouse effect pt. 2 if applicable
• What can you do
  o What we must change and why do we need to use renewable resources
• Add graphics to post-lesson debate and discussion…put picture with the task
• Create factsheets with post-lesson debate and don’t list stakeholders
• For ranking get rid of basketball and try to make it more Namibian specific
• Do guessing game first then do the ranking afterwards
• Great Cookoff—visually show the great cookoff since it may not be able to be done practically at certain points—fuel efficient stove, fireballs—-(3 types)
  o Fuel efficient stove boil at 4 minutes…then next…then open fire much later
  o Game

**Topic 3:**
• Create a story  
  o With increasing access to money, much of the population has become major consumers but don’t see a problem with the way they consume  
  o Address the fact that this consumerism trend is growing
• Set up the inequality issue in the beginning then focus on consumerism
• Change the title of consumerism to “what are our basic needs”
• Within healthy lifestyle: healthy eating, sustainable water use, healthy consumerism
• Possibly have this topic before energy
• Add in the theme of exercise
• Impact of SD on health in small section (just mention it or reworking it into the module)
  o Even just adding the icon
• Target level is for teachers, some things are too simple
• Make a game with appliances and water
• Have a discussion on paying for water (charged for management, treatment and supply of water)
  o Inefficient use of water
• For challenges of supplying water slide, add challenges of treating water
• Need and want should be in this topic as well  
  o As you gain more money, things are less about need and more about want
• Local water uses should go before challenges of supplying water
• Change the placement of the water meter game
• Tips on saving water (add the water meter game there)
• For the water meter game, create a story: 3 schools each started reading their water meters, they all start on the same number, and at the end of the week, they read the meter
  o Maybe one school have an ongoing leak
  o Schools should be in different areas: one in the city with a garden  
  o A school in a rural area
  o Click on the school and there is a voice over
• To summarize with water
  o The main issues of water in Namibia
  o What can we do to make sure the people who need water can get it
• How can we minimize our water use?
• Teach the teachers themselves how to live a healthy lifestyle (they have money)
  o Make it higher level
  o More info about minimizing meat
  o Impact on eating beef vs eating goat
  o How much calories, sodium, fats does a goat stew have vs kfc
• What the problem with processed food
• Bring back to sustainability (so how much water is used to produce certain things)
  o Chicken is an easy analogy to use
• Summarize sustainable ways to each with the chicken thing
• Add in exercise before wise water use
• Difference between hard labor and actual heart beating activities
• Make people aware of the main point of exercising

**Topic 4:**
• Reduce wording on waste section
• Maybe make the Venn diagram a different slide
• Come up with plan for how to reduce wording, but still provide the right information
• Activities: Alphabet trash game,
• Rent-a-Drum is the only company that recycles
• Municipality is directly responsible to remove rubbish and waste
• There are no alternatives for these companies
• Get in touch with Anita Witt
• There is no recycling unless school is a part of the recycling project
• You need take it to the recycling center 150km
• Already dramatic improvement from 5 years--Rent-a-Drum
• We need to have solutions
• Add this topic will cover for all of the topics
• A lot of presentation need to use smart software
• Are they aware of the quantity that we are actually talking about
• Waste that goes into the creation of one item
• Video is the best way to show the global waste crisis (5 or 10 minute video, not just a little clip)
  • Map of world with ocean current to show we are lucky that our ocean currents come from
    Antarctica which has no people and penguins don’t litter so we don’t have to worry about
    trash except from ships
  • In Namibia the waste that ends up is directly from ships
  • Relate to Asian countries that have mounds of rubbish in ocean
  • In other African counties with greater build-up of waste (Global Waste Crisis)
  • Add more things happen
  • Video: Story of Bottled Water
  • Namibian context--to relate the teachers to the content
• Activities:
  o Recycled fire balls…schools always have paper somewhere
  o Get old paint cans and make paint drums
  o Very little smartboard presentation
  o Plastic to teach skill-wise…look at Rent-a-Drum about what goes where for Namibia
• Reduce, reuse, recycle: Keep one story line or 5 R’s keeps with ethics like zero waste triangle
• People have a right to a plastic bag at a shop
• What is out there is Namibia that they can access…21st of September Clean Up Day, Clean Up Campaigns
• People litter on the clean-up campaign
• Recycle Namibia Forum…clean directory which gives the companies that need to be cleaned
• Wind is a problem from campaign because people do not know how to
• Recycle Namibia forum website

**Topic 5:**
• Talk about microplastics in the waste section since it was presented in what can you do
• Make the house Namibian
• This should be a summary of everything
• Wrap everything up and acknowledged the fact that we need to change the way we live but we already discussed that
• Importance of nature to Namibia
• Show the good life goals video then introduce the good life goals (make a role play activity)
• Make it emotional
  o Show them that they can do something
• Talk about how we can benefit ourselves but also how we can benefit mother nature
• Use Namibian examples and scenarios
• Wrong age group
• Instead of the eco handprint, use 17 goals and do one thing that they learned and one thing that they can do
  o Have them make a role play on one of the goals
• Find the video of the child speaking at the 2002 Rio de Janeiro conference

NaDEET April 12th, 2019

**Topic 1:**
• Make cover page for the entire topic
• Reference the quote of sustainable development (UNESCO)
• Some of the events on the timeline should go into a little more detail (such as the UN conference was held in Windhoek) Add the places
  o World Environment Day was established, etc.
  o The establishment of MEAN
  o The title should be relevant to Namibia
  o For the ones that are decades, use a different colored line
  o MOE (Ministry of Educations) ESD strategies was a part of the UN Decade of ESD decade
• Possibly make multiple timelines
• The header for the game should just be SDG Game
  o Round one, actions
  o Round two, challenges
• GAP should be on the timeline at the end
• On the slide that says Learning about Education for Sustainable Development, put the quote “targets for ESD”
  o The header should be “Where is ESD in SDG4”
  o The slide after should say “Learning about ESD”
• For the two-approach slide put the icon for goal #4
You don’t necessarily have to have the current graphic (the blue boxes?)

- For the slides with the actions; you must use the word “upscale” to show that the process has started but we need “to upscale everything that is going on”
  - Upscale by increasing the number of centers that we have, increase the number of people we talk to
  - Put in some advertising of the Ombombo mobile classroom
    - Corris has a nice graphic to show people using the Ombombo classroom
- Put the priorities for the ESD 2030 instead of the video
- Wrong video (learning about SDG 4)
  - There is a video called “think, live and act together. Be part of the change”

**Topic 2:**

- Change basketball to blank and edit
- Video: Long, man is very American but talking very fast
  - Video geared toward high school maybe
- Can we get it more efficiently think in terms of money;
- Guessing wattage game: Let’s explore other appliances: connect the appliances in a way people can see: categorize- low because you are not heating anything (maybe)
  - Heating vs. cooling elements
- Question on end to prompt educator
- Ranking Game needs to be changed in title
  - Change to Kwh so how long do you use these appliances
  - Rate the level A, B, or C refrigerator (teach that old appliances are costing them
  - Cooling vs heating vs Random appliances
  - Group apart and discuss the different appliances
  - Let’s check the actual power consumption by how long you have the appliances on
  - Add iron--lots of watts but not on long
  - Needs: fridge, iron, only need comp, electric kettle, AC, electric stove
- The Namibian Home
  - Have a rural house and an urban house or pictures of guys and introduce them
  - The communication can be end: chargers-solar vs. plug and edge vs. 4G
  - Percentages are unclear: needs to be clear
  - If rural is on top as first, then keep it consistent
  - Make clear that you have now moved over into access
  - Choices: cooking, communication, travel, heating
- How do we tackle these problems? Add transitions to say now what...needs an end to each of lessons. Take home message. Small transition for subtopic (flexible prompt) and topic what now or why did you tell me?
- Non-renewable: energy that cannot be replenished in a human’s lifetime
- Matching game descriptions
  - Give information on matching game in word document (table)
  - Add beeswax just to keep consistent with theme
- Use hydropower as your limiting factor and rotate the pie chart
- Look in global south (Costa Rica, Australia, African countries, or US desert)
- Impact on Environment: Before on top, after on bottom and before from Namibia (50 years ago and after would have a question mark to video
- Use a before picture of Namibia and what would it look like in 20 years (Use a question mark to signify this) …
- Maria still does not like flow
- Energy Matching Game: Energy currently available in Namibia
- Energy Deficit: utilize blank space and add bigger font
  - 600-energy demand, 400 what we are using
  - Fix infographic: make clear
  - Map of Namibia: on first map have it filling up on (demand=600) and second
- Post-lesson debate: debating renewable in the country
- List three groups on top and then just debate question
- Health and energy: collect firewood from far away-hard labor, fumes, spending hours cooking
- Education: sourcing instead of learning, school without electricity kids cannot study throughout
- Change title of what is energy to energy efficiency to
  - Delete the person
  - Add LED bulb to the other two bulbs
- Basketball game: Use Kilowatts per hour
  - Use the levels of consumption- Is it A, B, C….  
  - Add the topic of how long the appliances is used in a day
  - Remove the basketball theme
  - Must have: Refrigerator, iron, air conditioner, stove but only one form of laptop or TV
- The Namibian home: rural vs Urban
  - Have the statistics clear
  - Add rural house vs urban house…Maybe just cooking in Namibia”
  - Access
  - Cooking, transportation, food storage, entertainment, communication
- It’s time to be efficient
- Non-renewable and renewable energy slide
  - Add in a human’s lifetime
- Change title of Energy Matching game to Understanding our energy sources
- Health impacts: kids are spending time sourcing energy rather than studying energy
  - Having to physically carry wood to their home
  - Hard labor
  - Fumes that people are inhaling
  - Kids spend time sourcing energy instead of studying
  - Go straight to “Energy in our Daily Lives”
  - Before getting into the guessing wattage game, go through the three different light bulbs in talk about getting that energy more efficiently
    - Show how this also save money as well
- Guessing wattage game should be “let’s explore these other appliances”
- Categorize the heating elements, cooling elements
- Change the ranking game to kwh instead of watts but use the same appliances as the ranking game
- Must of have a fridge, iron, ONE computer or TV, an electric kettle, the ac, electric stove
- Have a rural house and an urban house, then have all of the appliances and whatnot inside the house
- Telephone is not needed, just use the cellphone
  - Cooking
  - Communication
  - Travel
  - Food storage
  - Entertainment
- Bring that comic back with Corris and Pandu
- Non-renewable: energy that cannot be replenished in a human’s life time
- We need to have better transitions between subtopics and for topics have the big takeaway or a short summary
- For the energy deficit page
  - Make the text as large as possible
  - 600 is what we are using, 400 is what we are importing
  - Fix the infographic in general
  - Instead of the scale, have a map of Namibia filling up with “water” and show that Namibia need 600mw, but then have 200mw filling up Namibia, then click on it again and say that the other 400mw are coming from other sources

**Topic 3:**
- Change Namibian food for Healthy eating and staying fit to inexpensive food
- For 5 ways to eat sustainably to 4 ways
  - Combine prioritize plants and minimize meats
  - Make the meat picture into Kapanas
  - For waste less food: use a photo of unfinished food plate
  - Add a slide before 5 ways that says “we are what we eat what mother earth gives us”
- Prioritize Plants and Minimize Meats:
  - 500 Liters of water to produce a chicken breast= 6 full bath tubs
  - Use 6 bath tubs to show your idea
  - Use half instead carbon emissions
  - The order: Vegetarian (low meat) meal vs carbohydrate meal…. Carbon impact and water…
  - Have a label underneath the pictures
- Center the Five different food group’s picture
- Waste less food:
  - Add that poor people don’t waste money
  - It is not clear that the numbers should NOT add up to the 30 % shown above. Viktoria is having a hard time grasping that…
  - Figure out a way to replace it with How to actually not waste food
  - See where food is wasted in Namibia
  - Maybe generalized ways where food is wasted in Namibia
- Eat locally:
  - If you buy your fruit from Namibia in a supermarket, then it is probably imported from South Africa. 2000 km or miles lol
  - Eat locally, less miles traveled by food, less carbon footprint,
  - 3 oranges: distance traveled, carbon footprint, Just put sizes instead of number, SA always have trucks
- Less processed and packaged food
- Be more dramatic
- Change Canned fruit and garden grown to PROCESSED POULTRY or maybe Russian Sausage
- Add graphics of packaging

- Stay fit
  - Get up and exercise for the calorie game

- Exercises you can do
  - Add the calories (Maybe)
  - Switch the stay fit and exercises you can do

- For SDG 3: Add a statistic about Namibia

- Water page: Avoid scrolling

- 5 Local water uses
  - Round up the numbers
  - Bigger number

- Average water uses in household
  - Change the cooking
  - Maybe flip the number and the dishes

- Just the dune and the sun for Challenges of supply water
  - Also scrolling
  - Remove the jug
  - Water itself is free but the treatment and access cost money
  - Popping up signs that say physical challenge

- Keep Showers short

- Water Meter Games:

- SDG 6: pop up statistics of Namibia

- Fix layout and picture of the slide before shop till you drop

- Inequality in Namibia: Fix Bank

- Growing Trend of Consumerism
  - Color code
  - Make a list for food, water and clothing
  - Add graphics

- The story of stuff

- For the last page: Discussion page
  - Have them pop up separately
  - Or have the class separate in groups and then come together at the end

- Change the colors of important words and add graphics to indicate the examples

- USE THE WHOLE PAGE

- Have the 3 discussion points come up separately
  - Discussion should be on consumerism in general rather than the story of stuff

- Have tips to curve consumerism

- About everything they have learned from the topic

- So, in Namibia what do you feel about consumerism, do you think peoples’ health is on the decline and what can we do about it

**Topic 4:**

- Change big red X for wrong on Pete the Pelican slide
- Make picture of waste on global waste crisis smaller
- Get rid of the story of stuff sentence on question
- Add word waste
  - Have last fact you show be about plastic bottles for transition

- Plastic in the ocean and on land (or in our environment)
  - Animals eat plastic
  - Pictures of goats with waste inside rather than Pete (more powerful with Namibian animal)

- NASA video add

- Write major ocean currents at the top and show video at first

- Globally if we do nothing
  - More facts not just three little ones
  - A little Namibia at the bottom (And in Namibia)

- Our local waste crisis waste disposal sites are wrong
  - Add landfills (municipalities or village councils)
  - Recycling centers
  - Recycling drop-off sites
  - May not have time for map

- Kupferburg landfill slide is now no longer true (spelt differently)
  - Now non-recyclables picture is recyclable

- If it is wrong say why it is wrong for recycle
  - Ex. pizza: grease
  - Additional or activity on sorting waste

- National slide: font is very small
  - Fix animations on slide

- Start with Oshana (Our local waste crisis)
  - Make video: Oshana, Windhoek, Walvis Bay, etc.
  - Then map of Namibia

- Limited recycling centers and not enough municipal
  - Windhoek, Swakopmund, Walvis Bay, Rundu, Oranjemund
  - Put date of study and if this could go to cement then it would be recyclable

- Slide on littering, video or something different or cartoon (comic)
  - Combo of apathy or right to litter or not knowing
  - Rubbish thrown out of car

- Waste has changed it is no longer biodegradable

- What can we do based on where we live?
  - If you live an urban area that has access to recycling
  - In urban they have single stream recycling
  - If you live in a rural area-reduce, reuse, recycle
  - Fit zero waste triangle will go into if you live in a place where you can recycle

- Add more to reduce slide

- Recycle sorting goes in the other section with the story

- Graph with pictures

- Recycle Namibia forum rather than rent-a-drum

- Download clean-up campaign

- Section on how to do a proper clean-up campaign

- Oshana, Namibia... start with this.
  - Map of Namibia
  - Very limited recycling center and not enough municipal waste centers
  - Be careful with company promotion:
- What can we do were we are?
  - Make sure what you have access for the orange bucket
  - If you live in the rural area, then you would have to use the 3Rs
- Make sure you told that story first thing
- Add school campaign

EduVentures April 23rd, 2019

**Topic 1:**
- SDG pyramid: environmental instead of planet, social, economic---add rather than delete
  - Lines to link people and social
- EduVentures’ Upscaling of Project
- Change to upscaling UNESCO
- Building Momentum change picture
- Evolved since first one--Corris
- Make introduction slide go to different pages
- Add the wording to economic, environmental, and social
- Or use the pens to draw lines between the 3 P’s
- Incorporated in the lesson
- Fix the EduVentures Upscaling slide
- SDG picture fix for 'Building Momentum'
- Make an upscaling slide

**Topic 2:**
- Energy efficiency slide: give definition of what energy efficiency is: one sentence under headline in yellow section
- In lesson plan before people guess explain what a KW is or put lightbulb for reference
- Put in perspective: how many watts in a KW
- Have bulb as reference then put it in terms of bulb and add price as well
- City of Windhoek or NamPower to find price
- Appliance Similarities: this could be a discussion or in lesson plan
- Iron uses more per certain time but overtime it uses less because it is not on 24 hours
- For graph of energy sources in Namibia make it interactive and have percentages appear
- Namibia needs 600 KW on Understanding Our Energy Sources
  - Have 60% appear first then have them guess the countries it comes from…it can be all at once or one at a time
- Could have windmill debate on a different type of source
  - People who live in vicinity or in community at large
- Change left and right to up and down
- Use another word for fueling (maybe: gathering)
- Put energy in our daily lives after appliance guessing game
- Change know your refrigerator: know energy efficiency of appliances
  - Generalize the tags and then use the fridge as a specific example
  - Or do multiple from different appliances
- For the energy accessibility, explain what accessibility is
- For non-renewable and renewable, the educator should ask for examples
Topic 3:
- Fix link on page minimize meats and prioritize plants:
  - Eat locally
    - Use negative for south Africa, 100N$ for Namibia and 10N $ for backyard (use different sizes)
  - Correct Braai
    - Search for Marathon chicken and traditional chicken
- Staying Fit
  - Clarify “Get heart pumping”
  - Add about fighting diseases like diabetes
  - And benefits too
- Water slide
  - Add the percentages to it (50%, 25%, 12.5&, 5%, .5%)
  - When clicked the 0.0003% will appear
- Average water use slide: Use a more urban picture for cooking
- Challenges slide: the water should decrease
- Tips on Saving water: Use appropriate slang for a full load
- Use statistic for the SD: NSA
- Fix Inequality in Namibia slide… The third item disappeared
- The story of stuff discussion:
  - Add a symbol to show that it is to be clicked
  - Maybe use a shopping bag icon

Topic 4:
- Have something appear and have them guess on 2050 slide
- Fix and in Namibia animation
- For reuse slide add more material- Corris likes the idea
- Fix things in the recycle bin?
- Make National slide words larger to be read-make hexagons bigger

Topic 5:
- It says 20 years and there are differing dates (2002, 2012)
- Three pillars- make it bigger
- Make words bigger on what are the good life goals
  - Animate it to become big
- Good life goals
  - Arrange things differently
  - Or make into two pages
  - Don’t need the word discuss or any of the directions
- For lesson plan add screenshot of where to click as well as written directions
- Also add activities and paragraph of content for each slide and instruction

APPENDIX I: LESSON TOOLKIT

Lesson Plan for the topic on Sustainable Development (SD) and Education for Sustainable Development (ESD)

Page 1: Main Introduction Slide
Instructions: There are three subtopics. Start with the first topic which is: Sustainable Development by clicking on the topic title which will direct you on the first page of the subtopic.
What is Sustainable Development?

Sustainable development is development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.

Content:

- The definition of sustainable development (SD)
- Ask audience what sustainable development means to them.
Page 3: A video on The World’s Largest Lesson (3 mins)

Instructions: Click on the image to play a video on sustainable development

Content: A brief overview about SD

Page 4-5: UN and Namibia’s Sustainable Development Timeline (20 mins)
Instructions:

- Interactive SD timeline
- Click on each of the events to reveal their names

Content:

**A timeline of sustainable developments related to the UN**

**1970s, United Nations Conferences:** Response to growing environmental movement, declared environmental education as a tool to address issues, set guidelines for environmental education

**1973, World Environment Day:** Celebrated for the first time on June 5th, today it is an annual event

**1992, UN Conference on Environment and Development:** Adoption of agenda 21 calling for action on a local level

**2002, World Summit on Sustainable Development:** Laid the foundation for United Nations Decade of Education for Sustainable Development (UN-DESD), international framework for action, introduction of term Education for Sustainable Development (ESD)

**2005-2014, United Nations Decade of Education for Sustainable Development (UN-DESD):** Period for education action, aimed to integrate principles of sustainable development into learning in order to address social, economic, cultural and environmental problems

**2015-2030, United Nations Sustainable Development Goals (SDGs):** A universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity

**A timeline of sustainable developments related to the Namibia**

**1982, Environmental Education Association for Southern Africa:** Formation of network and coordination for the region

**1990, Article 95 of the Namibian Constitution:** State obliged itself to protect the environment and promote sustainable utilization of natural resources
1990s, Environmental Education Centers Established: First governmental and nongovernmental environmental education centers opened

1994, Namibian Environmental Education Network (NEEN): Nationwide networking, developed the national environmental education policy

2009, Education for Sustainable Development Strategy: Namibia’s response to the global call to develop strategies for UN-DESD
Who is the leading organization attempting to implement sustainable development globally?
Supplementary Material

**How does it come about?**

“SDG Goals the United Nations 17 Sustainable Development Goals (SDGs) were launched and adopted by world leaders and 193 countries on 25 September 2015 at an historic United Nation Summit as the 2030 Agenda for Sustainable Development in transforming our world.

The SDGs serves as a compass for the world so that we can meet our responsibilities to succeeding generations. The seventeen goals also combine to provide a tangible guide to our daily lives – a set of reference points to advise us what to do as peoples, as consumers, producers, civil society, business, and policy makers.

For the SDGs to be achieved, everyone needs to know about them and do their part: people from the governments, the private sector and civil society.” [1]
Instruction:
- Interactive SDGs
- Click on the box to reveal a brief description of the respective SDGs
The Three Pillars of Sustainability

SUPPLEMENTARY MATERIAL

Sustainability is most often defined as meeting the needs of the present without compromising the ability of future generations to meet theirs. It has three main pillars: economic, environmental, and social. These three pillars are informally referred to as people, planet and profits. [2]

Instructions:

- Shows a diagram of the three pillars of sustainability and how to achieve it
Instructions:

- Shows the SDGs along with their linkage to the three pillars of SDG

**SUPPLEMENTARY MATERIAL**

- Goal 1-10 are linked to humanitarian, inclusiveness and PEOPLE harmony
- Goal 11-15 are linked to sustainability nature and ECOLOGICAL harmony
- Goal 16-17 are linked to peace, partnership, values of SPIRITUAL harmony [1]
Page 11-48: The SDG Game I & II - Matching the SDGs with their Challenges and Actions
• The aim of this game is to familiarize participants with the 17 SDGs including their purpose and structure
• Review the SDG game lesson plan to see the rules and guideline of the game
• Click on the large SDG symbol to see the correct answer as directed above (See the lesson toolkit for additional direction)

Page 49: Video- MAKE IT YOURS NAMIBIA (2:35 mins)

Instructions:

• Click on the image to play the video

Content: An inspirational video relating the UN and the sustainable developments goals to Namibia
Page 50: Introduction slide about SDG 4 (ESD)

Content: Introduce the SDG 4 (Quality Education)

Page 51: Description of ESD and its location within SDG 4

"By 2030, ensure that all learners acquire knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development" - Target 4.7
Content: Introduction to ESD
Page 52: Video: “Think, Live and Act together. Be part of the change”

Content: A brief video on teaching ESD

Page 53: The Goal of UNESCO’s GAP program

Content: Emphasize the importance of Upscaling
Click on the icons to fade in the priority action
Discuss the Five Priority Actions
Page 55: EduVenures’ upscaling of project

Content: Introduce EduVentures’ project

Page 56: UNESCO GAP for Sustainable Development

Content: Emphasize that GAP uses a two-fold approach method
SDG 4 helps integrate sustainable development into education and the SDGs integrate education into sustainable development.

Page 57: UNESCO GAP ACTIONS

- Briefly explain the actions involved in GAP
• A brief overview ESD 2030
Topic 2: Energy: Household & Transport

Sub-topics:

1. Energy Today
2. Energy Accessibility in Namibia
3. How we emPOWER Namibia
4. Energy Consequences
5. What Can You Do?

Slide 1:

Content: N/A

Instruction:

If you click any hexagon or subtopic, you will be immediately brought to the subtopic’s main page. If you are continuing to ‘Energy Today’ you may either click the title or arrow on the keyboard.

**Sub-topic 1: Energy Today**

Slide 2:
Energy Today

Instructions: N/A

Content:

- Open the conversation by asking the educators “what forms of energy do you see in your daily lives?”, Allow 2-3 Responses.
  - Ask how did they arrive here, was it via car? Bus? What form of energy fuels these machines? (A: fuel oil, a non-renewable source)
- Now prompt “What energy are we using right now in this room?”
  - Point out any applicable examples: lighting, AC, or even the energy we use to breathe
Instructions:

- Click on the image for the video to play, use full-screen and check if the speakers of the Smart Board is working beforehand.
- End Video: 4:29

Content:

- Ask the educators for a definition of energy.
  - A: Energy is power derived from the utilization of physical or chemical resources, especially to provide light and heat or to work machines.
- The video will covers a variety of complex content and incorporate visuals to accompany this. Below is a list of topics covered (in order of appearance), while it is not important that the educators remember all of these topics, the italicized topics are those that will be reviewed later in this topic.
  - Kinetic & Potential Energy
  - LED Desk lamp
  - Earth’s physical systems
  - Internal & External sources of energy
  - Sunlight & Organic matter
  - Energy in the Body
  - Energy Efficiency in Food chains
  - Non-renewable & Renewable Sources
Slide 4:

Instructions: N/A

Content:

- For the rest of the topic, we will referring to energy in units of wattage (W), therefore it is important for the educators to be familiar with this.
- Begin the slide by asking educators how do we measure length and weight? (A: meters and kilograms). Then state that just as we measure these, we use units to measure energy in our household appliances. One of these common units are kilowatts (kW).
  - Just as 1 kilometer = 1000 meters, 1 kilowatt = 1000 watts

Additional Resources:

- If the educators are interested, here are videos and lessons that are related to this topic.
  - Understanding Watts, Amps, etc. https://dengarden.com/home-improvement/Watts-Amps-Kilowatt-Hours-What-Does-it-All-mean
  - How to Calculate Wattage https://www.wikihow.com/Calculate-Wattage
Slide 5:

Instructions:

- Click on the orange box to show the definition of Energy Efficiency when prompted
- Click on each light bulb to discover how many watts it uses for the same amount of brightness (800 lumen)
- Click on the ‘Why does it…” text to go to the next slide

Content:

- When entering the slide, ask the teachers what do they think it means to be energy efficient? Remind them of the previous video and how it talked about energy efficiency in the food producer chain.
- Afterwards, click on the box to reveal the definition of Energy efficiency. Read it aloud and then transition to the question.
• Allow the teachers to come up and click on the lightbulb they believe uses the least amount of energy after 1-2 minutes of discussion amongst themselves.
• Once the LED light is clicked, ask they why do they think it matters. Afterwards, click on the text at the bottom to move to the next slide.
Instructions:

- Click on each lightbulb to reveal:
  - Initial wattage
  - Initial cost of purchase
  - Lifespan of each bulb
  - The number of bulbs to power 25,000 hours (~3 years)
  - The total cost for purchasing bulbs over time

Content:

- Before clicking on the bulbs, it is important to explain the arrows. As the previous slide already explained, the light bulbs increase in order of efficiency. However, it also increases in order of the cost to purchase a single bulb.

Slide 7:
Instructions: Click on each object to reveal the number of light bulbs it uses and also the wattage number.

Content:

- Remind the teachers that one light bulb uses 60 watts
- Then ask the educators to form into teams of 5. For each item (order does not matter) each group will come up to the board and write in the white space to the left on how many light bulbs it takes to run one of the machines above.
- If there is a time restriction, the following are the most important items to stress: Refrigerator, Kettle, Iron and A/C

Slide 8:
Instruction: N/A

Content:

- Generate a Discussion by asking the teachers on what similarities they notice in the appliances that use more energy
  - A: Heating elements, but why?
  - Remember slide 4, on how 1 Watt = 1 Joule of Light + heat energy/second; so while watts do measure a type of energy it also measures the heat and light an object gives which can be seen in a stove easily
Instruction: N/A

Content:

- Before the teachers come to the workshop, ask them to record or photograph their energy labels on fridges, freezers or even laptops.
- On this slide, go through what each portion means on the energy label and then use the 2 fridges to compare. Ask the educators the pros and cons of each fridge (e.g. food storage spacing, initial cost, etc) and then have educators reflect on their own energy efficiency.
Instruction: Drag each item the corresponding box

Content:

- Now that we have spoken about wattage and energy over time, it is time for teachers to come up to the board and see if they have understood the material presented.
- While the teachers have learned what objects uses the most energy at a single point in time, they now must guess how much energy does an object use in a typical day at home.
- Have the teachers split into groups of two and physically write down the order of their guesses. Give 5 minutes for group discussions and then have one representative from each group to go up to the Smart Board and play the game. You may give a the winning team a prize.
- **Main Point:** Compare the iron and the fridge, while one uses a lot of energy at once, the other uses a lot of energy over time. While both are important for the household, simple decisions such as investing in an energy efficient fridge or buying a lower wattage iron can save you money over time.
Slide 12:

Energy Accessibility in Namibia

Instruction: N/A
Content: N/A
Instruction:

- Click on each image to show the accessibility between the urban (right) and rural (left) population towards that particular object

Content:

- Each image dictates a percentage between the urban and rural population. The images are: refrigerator, telephone, sewing machine, cell phone, and freezer box. Ask the group what percentage of the urban/rural Namibian population can access each item and click to reveal the result.
- After going through all of the objects, ask the group to state a reason why accessibility to this item is important and if accessibility is limited, what alternatives can be used.
Example: Sewing machine can be replaced by handheld machines or even hand-sewn materials

Slide 14:

Now that we know how we use energy, it's time to see where it comes from!

Instruction: N/A

Content: Reiterate that the previous sections focused on how we as a society use energy and how its current accessibility is in Namibia. Since there are issues with energy accessibility, now is the time to see where we get this energy in the first place and identify any ways to broaden accessibility despite the obstacles met.
Slide 15:

How we emPOWER Namibia

Instruction: N/A
Content: N/A
Instruction: Move the lightbulb around to see the definition of nonrenewable energy and renewable energy.
Choose 2 members of the group to stand up and state their definition of (un)renewable energy. After both members finish, allow each one to move the lightbulb under their respective term to reveal the definitions.
Instruction: Move the term on the left (Energy Source) to the center of the yellow flower and its matching term on the right (in Namibia) to the center of the pink flower.

Content:

- Have a teacher come up and make an attempt to match a term with its definition. The program will have the cards bounce back if it is incorrect. If it is correct, the terms will come together and go in the hexagon above.
- The correct answers are:

<table>
<thead>
<tr>
<th><strong>Energy Source</strong></th>
<th><strong>Within Namibia</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>In Ruacana on the Kunene River</td>
</tr>
<tr>
<td>Wind</td>
<td>Has only 1 machine in the Erongo region</td>
</tr>
<tr>
<td>Bush-to-electricity</td>
<td>Invader bush in the north can be used as biomass energy for this</td>
</tr>
<tr>
<td>Solar</td>
<td>A form of it is used in cattle farms for water pumping</td>
</tr>
<tr>
<td>Uranium</td>
<td>This is entirely exported due to the lack of nuclear facilities to manage it</td>
</tr>
<tr>
<td>Petroleum</td>
<td>This powers nearly all transportation in Namibia and is imported</td>
</tr>
<tr>
<td>Coal</td>
<td>This entire source is imported and takes the form of sedimentary rock</td>
</tr>
<tr>
<td>Oil</td>
<td>This can be found both off-shore and on-shore</td>
</tr>
<tr>
<td>Beeswax</td>
<td>This is exported and can be used to generate light, lip balm, and moisturizers</td>
</tr>
</tbody>
</table>

Additional resources:

- Renewable Sources
  - Wind turbines transform the wind's kinetic energy into electrical energy. This energy produced can be used to pump water to the surface, produce electricity, and charge batteries.
  - Solar energy is the technology that harnesses the sun's energy to make it usable. Photovoltaic cells are used in solar panels and when sunlight hits the cells, it knocks electrons loose from their atoms. As those electrons flow through the cell, they generate electricity that is used. Namibia has very minimal cloud coverage and the southern parts of the country could experience 11 hours of sun per day. One of the major solar uses in Namibia is solar water pumping, which takes place at cattle farms.
  - Bush-to-electricity uses wood chips made from encroacher bush to create power and energy. Much of the north of Namibia is infested with invader bush. It is able to provide possibilities for the use of biomass energy. The plant production is similar to a coal-fired plant.
- Non-renewable Sources + Namibian Specific
  - All coal in Namibia is imported from South Africa. The majority of coal used is by the Van Eck thermal electricity in Windhoek and the copper smelting process in Tsumeb.
Uranium was formed in supernovas 6.6 billion years ago, but its slow radioactive decay is what gives off energy today. This occurs due to Uranium's three isotopes of the different forms occurring in nature. When these isotopes are radioactive or unstable they must change in way that allows them to become more stable.

Oil occurs by its accumulation in pore spaces in various sedimentary rocks including sandstone, limestone, and dolomite. It is stored similar to that of water in a sponge. The original formation is similar to petroleum in terms of the layer of dead organisms.
Instruction: Click on the circles to reveal the percentages and energy source

Content:

- The graph depicts the total energy that Namibia uses in a single year (2016). Have the teachers guess what type of energy source it is (non-renewable or renewable) and the specific type of source.
  - From clockwise, it is Oil, Coal, Solar, and Hydropower
  - Be sure to note that most of this energy is renewable energy which is a great feat considering how the rest of the world uses non-renewable energy
Slide 19:

**Understanding Our Energy Sources**

600 MW

Instruction:

- Click on the bottom of the Namibian map to reveal its supply, click the middle to reveal its imports
- Click on the yellow box to reveal a percentage
- Click on the circles to reveal a country that Namibia imports energy from

Content:

- We now know where we get our energy from and how we use it in society, however, it is also important to understand that all the energy we use is not directly from Namibia. In fact, our country demands 600MW (megawatts) yet (click on the bottom part of the grey picture) we can only provide 200MW.
- Therefore (click at top part of grey picture) we need 400MW to fulfill our need of 600MW.
- (Click on the yellow box). We meet this need by importing most of the energy from neighboring countries
- Have the teachers guess for 30 seconds on which countries contribute the most energy. Afterwards, click on each circle to reveal the country.
Slide 20:

**Instruction:** N/A

**Content:**

- Divide the teachers into 3 groups (e.g. ~7 per group) and have them use the factsheet to gather information whether their represented stakeholder will promote or argue against the implementation of windmills. Give 5 minutes for discussion and 1 minute for each stakeholder to debate. Allow only 2 rebuttals against each stakeholder and then have a final vote of whether more windmills should be implemented in Namibia.

- **Factsheet:**
  - [https://www.renewableresourcescoalition.org/wind-energy-pros-cons/](https://www.renewableresourcescoalition.org/wind-energy-pros-cons/)
Non-renewable Energy Consequences

Instruction: N/A
Content: N/A
Instruction: Click on the Before & After to reveal an image.

Content:

- Click on the Before & After in the black dashed lines on the left and explain that over a 100 year period, this area changed drastically and completely reshaped the vegetation and wildlife that was present.
- Now click on the Think Namibia: Climate Change video
- After the video, click on the Before & After and ask the class, ‘What do you think will happen to Namibia 100 years from now if we do not change?’
Impact on Health & Education

86% of Rural population use fuelwood

40% of Schools & Health facilities without electricity

Kids spend more time gathering energy than studying energy
Instruction: Click on each video for it to play.

Content:
The first video introduces what SDG Goal #7 is and the second focuses on recent African initiatives towards cleaner energy.
Video Link:

- https://www.youtube.com/watch?v=-1EjiWqNtCk&t=3s

Instruction:

Content:
• Image 1: Delta Secondary School. By using natural lighting instead of electrical, more energy is conserved.

• Image 2: NUST Solar Taxi.  https://www.nust.na/?q=centres/innovation-design-lab/innovation-design-lab-projects


• Image 4: Class in the Grass.


Slide 28:

Now what will you do next?
Content:

Have the teachers go into groups of 4 and discuss what actions that will take concerning any of these topics:

- Making their classroom energy efficient
- SMART (Sustainable, Measurable, Attainable, Rationale, and Timely) energy choices in their lives

Slide 1:

Healthy and Sustainable Living

This topic will include:

- Healthy Eating and Staying Fit
- Wise Water Use
- Rising Consumerism
Instructions:

Each of the icons can be clicked to take the instructor to the introduction slide of each of the three subtopics listed above.

Content:

Go over each of the subtopics that will be covered.
**Instructions:**

By clicking the large picture on this slide, it will take the instructor to the main topic page.

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Slide 3:

**What are your needs?**

On an index card write down seven things you need in your every day life?
Instructions:

The educator will have each of the teachers in the workshop write on a notecard seven things they believe they need in their everyday life. Have them place the notecard to the side to be addressed at the end of the entire topic.
Instructions:
The four basic needs will fly in from different directions and the educator will then introduce these needs.

Content:
The four basic needs are food, water, clothing, and shelter. This simply an introduction into the sustainable living topic.
Instructions:
The information will fly into the screen and the instructor will simply explain read this information. The instructor can also ask if any of the teachers have similar examples for when our needs turn into our wants.

Content:
A basic need that we have is water. This water can be used for washing whether it be food, clothes, or ourselves. However, when one takes this basic need and uses it in a way that is not necessarily needed it becomes a want and in this scenario the want becomes a swimming pool.
Instructions:

By clicking the large picture on this slide, it will take the instructor to the main topic page.
Instructions:

By clicking any of the icons in the top left corner it will bring the instructor back to the introduction slide of the subtopic that the slide is included in.

Content:

These are the five basic food groups that we all know so this is simply a brief overview that not much time needs to be spent on.
Instructions:

By clicking any of the pictures of the different food groups, the carbon footprint of one food from the food group will appear. The end result is shown in the picture on the right.

Content:

All of our food contains a carbon footprint. Carbon footprint is the amount of carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization, or community. Greenhouse gas emissions are produced by growing, rearing, farming, processing, transporting, storing, cooking and disposing of the food you eat. A large impact can be made on one’s carbon footprint by changing the food that they eat on a day to day basis.

Additional Resources:

http://www.greeneatz.com/foods-carbon-footprint.html
Instructions:

Any of the pictures can be clicked on to take the instructor to a slide that provides more information on each of the ways to eat sustainably. The recommended order is minimise meats and prioritise plants, eat locally, eat less processed and packaged foods, and then waste less foods.

Content:

Each of these ways will be addressed on their own pages.

Additional Resources:

Instructions:

On each of the sections of both pictures is split into three portions. By clicking each portion the information will appear. The recommended order to click is the first portion of the left picture then the first portion of the right picture, the second portion of the left picture then the second portion of the right picture and the last portion of the right picture. The slide on the right portrays the end result after clicking each portion of the two pictures.

Content:

It is suggested to fill half your plate with vegetables and fruits as part of an optimal diet, but planning our meals around produce benefits the planet as well. Shifting to a more plant-based way of eating will help reduce freshwater withdrawals and deforestation — a win-win for both our personal health and the environment.

The Healthy Eating Plate already suggests reducing red meat, and now there’s another reason to treat it more as a condiment than a main dish. Meat production is a substantial contributor to greenhouse gas emissions – beef production especially – and the environmental burden deepens, as raising and transporting livestock also requires more food, water, land, and energy than plants. To eat for our own health as well as that of the planet, we should consider picking non-meat proteins such as nuts and legumes.

Additional Resources:
Instructions:
Click each of the reasons to eat locally to see the impact by where you choose to get your food.

Content:
By eating locally, you are reducing the amount of distance your food travels therefore reducing your carbon footprint.
Exploring locally also helps you meet the people who produce your food. Such relationships are opportunities for education: you can learn how your food was grown, when it was harvested, and even how to prepare it.

If you are buying locally chances are you are buying seasonally as well. Seasonal produce doesn’t require as much artificial help in growing, so you’ll find less pesticides and chemicals, and less human assistance in general.

Additional Resources:
https://foodrevolution.org/blog/why-buy-local-food/

Slide 12:

Less processed and packaged food

- Low in nutrients and fiber
- Added sugar, fats, and sodium
- Packaging is added waste

Quick Tip: store bought braai packets ↔ home-made

Instructions:
The educator will simply read off the reasons to eat less processed and packaged food. Then they will introduce the quick tip that teachers can do at home.
Content:

A lot of crop acreage is devoted to cereal grains that are harvested for packaged foods and edible oils, both of which have very low nutritional value. The result is that we’re unknowingly eating a lot of food that’s made mostly from soy and corn, both of which waste a lot of resources to make and take over land that could instead be used for fresh produce.

Processed foods contain lots of added sugar and it is this sugar that is harmful for our bodies. These foods are also engineered for overconsumption and our taste buds tend to gravitate toward these foods that contain high sugars, fats, and salts. Much of our nutrients are often lost in processing synthetic vitamins and minerals are added to the foods to compensate for what was lost during processing.

Additional Resources:

https://www.medicalnewstoday.com/articles/318630.php

Slide 13:

Instructions:

Click on each of the three graphs to reveal how what wasting 30% of our food globally is actually causing us.

Content:

When we throw away food we are throwing away natural resources and money. Worldwide about 30% of food that is produced is wasted. With the wasting of these foods we are also wasting the many resources that were used to produce these foods. This includes 21% of the landfill is being
taken up to get rid of this waste food. It took about 18% of the world’s croplands and 21% of the world’s fresh water to produce the food that is being wasted.

Instructions:

Click on each of the images to learn the story of how to eat a chicken sustainably.

Content:

The goal is to eat in an overall sustainable way. In order to do this here is a provided example of how this can be done and why it is actually sustainable. The example is a chicken that was raised
completely at home. Because the chicken was raised at one’s home it is locally raised and one would be eating locally. There will be no processing or packaging involved because the chicken does not need to be stored for buying in a market. Therefore, no processing needs to be added to allow the chicken to stay fresh and no packaging is used to store the chicken. No food will be wasted because every part of the chicken will be consumed and used in some way in other words a marathon chicken.

Activity: Reading Labels Game

Aim: To learn how to read and understand a nutrition label (focusing on calories, fat, sodium and sugar) to empower learners to improve their diet.

Description: The environmental educator will first lead a discussion on the basics of a nutrition label using a Liquid Fruit Apple Juice label. They will only focus on serving size, calories, fat, sodium, and sugar. After the discussion, the learners will have the opportunity to see exactly how much fat, sodium, and sugar are in foods they eat on a regular basis. After each group has had time to think about whether their food is considered healthy, the groups will present their foods to their class. As each group presents we will have a discussion on which food is “more healthy” and why.

Time: 45 minutes

Materials: 2 copies per table of Liquid Fruit Apple Juice nutrition label, Liquid Fruit Apple Juice, 1 measuring cup, 1 clear glass cup, nutrition labels for mealie pap (soft), bread with jam, meat pies with chips, mealie pap and stew, grape Fanta, and water, labels with keywords serving size, calories, fat, sodium, sugar, and 3 ↓, food replicas for mealie pap, bread with jam, meat pies with chips, mealie pap and stew, grape Fanta, and water, and premeasured amounts of fat, sodium, and sugar to go along with all the labels.

Preparation:

1. The necessary materials need to be organized and present.
2. The food replicas need to be made or bought ahead of time.

Directions:

Discussion:

1. Explain to the learners first what the nutrition label is and second why it is important for people to be able to read it. Tie its importance back into reaching our healthy diet goal discussed with My African Basket. Explain to them that it shows us exactly what nutrients and ingredients are in our foods we eat.

Serving Size:

1. Put the term “Serving Size” on the board.
2. Ask the learners to find the words serving size and say the number next to it out loud.
3. Ask them if they have any idea what this means.
4. Measure out 1c of apple juice and pour it into a glass drinking glass so they can see how much liquid is in there.
5. Explain to them that a serving size means that that much apple juice contains the following amount of nutrients listed out on the nutrition label.
6. Ask the learners if they usually drink more or less apple juice than that. Depending on their answer, discuss if the nutrient information would be more or less than the information on the nutrition label.

**Calories:**
1. Put the term “Calories” on the board.
2. Ask the learners if they remember what this term meant from the running game earlier. Remind them how when you burn more energy by doing things like running you need to put more energy or calories back into your body.
3. Ask one of the learners to find the number next to the word calories for you.
4. Explain what that numbers means in reference to that apple juice.

**Fat:**
1. Put the term “Fat” on the board.
2. Ask the learners to find the word fat on the nutrition label and say the number next to it.
3. Explain that fat is necessary for our bodies to function, but we want to make sure that number doesn’t get too high on the label because then it can hurt our bodies.
4. While saying that, place a “Down Arrow” underneath fat.

**Sodium:**
1. Put the term “Sodium” on the board.
2. Ask the learners if they have ever heard of this word before. If they say no, explain to them that it is just a fancy word that scientist use for salt.
3. Ask them to find the word sodium on the nutrition label and to say the number next to it.
4. Ask the learners if they think this is a lot or a little amount of sugar.

5. Explain to them that just like fat, we can have a little bit of sodium in our diets, but we don’t want that number to become too big because then it can hurt our bodies.

6. While saying that, place a “Down Arrow” underneath sodium.

Activity:

1. Collect the Liquid Fruit Apple Juice labels and pass out 1 nutrition label per group. 2. Also pass out the corresponding premeasured amounts of sugar, fat, and sodium and the food replicas that go with that label. 3. Make sure they know which bag or container has sugar, sodium, and fat.

4. Explain to them that using those measurements and the other information on the nutrition label, they need to decide whether or not their food is considered “healthy”. Explain that in order to be a “healthy food”, the fat, sodium, and sugar need to be amounts and the calories need to be a reasonable amount.

5. Give them about 10-15 minutes to discuss whether or not their food is healthy. Let them know that they will be presenting their food to the class.

6. Have the two groups with breakfast foods come up together. Let each group discuss one at a time whether or not they thought their food was healthy.

7. Have both groups hold up their containers and ask the class which food they think is healthier and why.

8. Next, have the lunch/dinner foods come up together. Let each group discuss one at a time whether or not they thought their food was healthy.

9. Have both groups hold up their containers and ask the class which food they think is healthier and why.

10. Finally, have the drink groups come up together. Let each group discuss one at a time whether or not they thought their drink was healthy.

11. Have both groups hold up their containers and ask the class which drink is healthier and why.

12. Once everyone has presented, have the learners draw a picture of the healthiest meal to put on their box.

13. Make sure the learners include 2-3 food groups in this meal. Feel free to use a lunch/dinner meal as an example.
Slide 15:

Staying Fit

- Why exercise?

- Get heart pumping!
- Tired heart pumping
Instructions:

Click on the large rectangular box to determine why to exercise.

Content:

Physical activity or exercise can improve your health and reduce the risk of developing several diseases like type 2 diabetes, cancer and cardiovascular disease. Physical activity and exercise can have immediate and long-term health benefits. Most importantly, regular activity can improve your quality of life. A minimum of 30 minutes a day can allow you to enjoy these benefits. Some other benefits of physical activity are reduce your risk of a heart attack, manage your weight better, have a lower blood cholesterol level, lower the risk of type 2 diabetes and some cancers, have lower blood pressure, have stronger bones, muscles and joints and lower risk of developing osteoporosis, lower your risk of falls, recover better from periods of hospitalisation or bed rest, and feel better – with more energy, a better mood, feel more relaxed and sleep better.

Additional Resources:

Instructions:
Click on each of the arrows to figure out how you can fight three excuses to exercising.

Content:
If the excuse is that you are too tired to workout you should know that working out actually gives you energy that you will be able to use for the rest of the day. If you do not have time to workout you can schedule time just like you schedule other things like appointments. If you think that working out is too expensive then there are plenty of at home exercises you can do that will be discussed on the next slide.

Additional Resources:
https://healthplans.providence.org/fittogether/find-your-fit/physical-activity/fit-exercise-into-your-day/battle-your-exercise-excuses/
Instructions:
Click on each of the figures to reveal the types of exercises that can be done any day.

Content:
Ideally one would do thirty minutes of aerobic exercising a day. Aerobic exercise improves circulation, which results in lowered blood pressure and heart rate. Some examples include: brisk walking, running, swimming, and cycling.

At least two nonconsecutive days per week of resistance training per week are suggested. It can help reduce fat and create leaner muscle mass. Research shows that a combination of aerobic exercise and resistance work may help raise HDL (good) cholesterol and lower LDL (bad) cholesterol. Some examples include: push-ups, squats, and free weights.

One should stretch and practice flexibility every day before any workout. These exercises benefit musculoskeletal health, which enables you to stay flexible and free from joint pain, cramping and other muscular issues. Some examples include: tai chi and yoga.

Additional Resources:

Activity: Calorie Game
Description: This activity teaches learners how to read their heart rate and to compare different levels of physical exercise. The learners will be divided into 3 groups that will be assigned different activity levels. They will get the chance to see how their activity level is related to how much their heart rate changes. After the activity is finished, a discussion will be led to familiarise them with the terms “calories” and “energy”.

Time: 15 minutes
Location: Outside
Materials: stop watch

Preparation:

1. Divide the class into three groups—“runners”, “walkers” and “sitters”.
2. Draw a finish line in the sand about 50 meters away from the main building.

Directions:

1. Have the learners stand with their assigned group.
2. Explain to the learners that they will measure their heart rate by measuring their “pulse”. Learners should place their hand on their wrist or neck to find their pulse.
3. Now tell the learners to start counting the number of beats while silently counting 20 seconds.
4. Ask the learners how many beats they counted. Get a feel for the average for the group.
5. Now explain that each of the three groups will do a different exercise. The runners must run as fast as they can to the finish line and back again, while the walkers must slowly walk to the finish line and back and the sitters must just sit and relax.
   a. Make sure to tell the walkers that it is not a race and that they need to walk at a normal pace.
6. Once all learners are back, re-measure all the heart rates and again ask the number of beats that everyone counted.
7. Lead a discussion with the group including the following:
   a. Who had the biggest change in heart rate? Why?
   b. In order to have energy, we need to eat food. Food = energy
   c. Introduce the word “calories”. Calories tell us how much energy a certain type of food has in it.
   d. What would happen if a person “only sat” and didn’t do any exercise? What happens if a person does more exercise than the calories s/he eats?
   e. Our goal is to have daily calories = daily energy output. If it is not balanced we will most likely gain or lose weight.
Instructions:

Click on the Sustainable Development goal to reveal the aim of the goal in Namibia.
Slide 19:

Instructions:
Click on the large image to be taken back to the introduction slide of this topic.
Instructions:

Click on the raindrop to guess the amount of water available for consumption in the world.
**Instructions:**

Click on each of the images contained in the pentagons to reveal the percent of usage of each of the water uses in Namibia.
Instructions:
The instructor will simply go over each of the average water uses in an Urban household.
Content:

Dishwashing: Depending on the size of the household washing dishes by hand uses about 50 litres of water whereas an efficient dishwasher only uses about 6.5 litres.

Gardening: A drought-tolerant garden in your home is a good idea. Water your garden with a watering can and for many plants you can re-use your dish water.

Car Wash: There are many different ways to wash a car, but some are more efficient than others. By using a hosepipe it is about 380 litres, by using a bucket and sponge it is about 50 litres of water, and using a water-less green car wash you are only using about 1 litre.

Laundry: More water and washing powder is used when washing by hand than using a washing machine. However, only 30% of people worldwide have access to a washing machine.

Bathing: If 25% of the households in Windhoek installed a low flow showerhead, N$2.5 million can be saved.

Toilet: The average person uses the toilet 5 times a day. That can be about 60 litres/person/day.

Instructions:

Click on each of the images to reveal a challenge of supplying water. The order should start be one to five.

Content:
Because Namibia is a desert country, open source storage of dams leads to evaporation, which would result in the loss of water. The other problems are broken pipes, treatment, and transportation. These often lead to a challenge because people will receive unsanitary water.

Post Lesson Discussion

Why is there a charge on our water? What are we actually paying for?
Instructions:
The educator will lead a discussion on why there is a charge on water.

Content:
When paying for water we are often paying for the treatment and transportation of water. It is not that we are actually paying for the water, but all of the aspects that go into it to make sure that it is safe for consumption.

Slide 25:

Tips on Saving Water
- Keep showers short
- Don't leave tap running
- Water gardens early or late
- Check your water meter
- Only wash with a full load of laundry
- Re-use water
Click on each of the raindrops to reveal a tip for saving water. The educator can have the participants guess some tips before revealing the list.

Content:

There are many ways that one can save water like keeping showers to about five minutes, do not leave the tap running when it is not necessary instead brush your teeth with a cup of water to avoid this and use less water. Water your gardens early in the morning or late at night in order to avoid evaporation. Also check water meters to check for any leaks that may happen and re-use any water that you can like dishwater to water your plants.
Instructions:

Click on the Clean Water and Sanitation Sustainable Development Goal to reveal the aim of Namibia in terms of the goal.
Instructions:
Click on the image to be taken back to the introduction page of the topic.

Activity: Shop Til You Drop
(Will be provided by NaDEET)
Instructions:
Click on each of the icon images to reveal information on inequality in Namibia.

Content:
Namibia has recently been characterized by as upper middle income as of 2015.

Additional Resources:
Instructions:

Click on the large rectangle to reveal the definition of consumerism.
Instructions:

Click on the video image to play The Story of Stuff Video. It is 22 minutes and will cover consumerism as a whole.
Instructions:

Click on each of the Sustainable Development goals to reveal the aim of each goal in Namibia.
Instructions:

Click on each of the shopping bags one at a time to reveal a discussion question for the overall topic. The questions are listed on the left so the educator can choose depending on time. Only reveal one question at a time.
Lesson toolkit on Topic 4: Waste

Suggested Schedule:

Total estimated time: 3.5-6 hours

9am - 12pm
- The Global Waste Crisis
- The Local Waste Crisis
- The beginning of What Can We Do?

12pm – 1pm
- Lunch

1pm – 3/430 pm
- “Reuse” project/activities
- Conclude with the rest of the module
Topic Four: Waste

Slide 1:

Suggested time spent: 30 seconds

Instructions: There are three subtopics. Start with the first topic which is: The Global Waste Crisis by clicking on the topic title which will direct you to the first page of this subtopic.

Content: Go over the topics to be covered.
Subtopic: The Global Waste Topic

Slide 2:

Suggested time spent: 1 minute

Instructions: Click on the scale to make the weight appear.

Content: If we do not change our habits on waste management, by 2050, there will be 2.5 billion tons of waste circulating the Earth.
Slide 3:

Suggested time spent: 20 minutes

Instructions: Click on the four larger circles to make discussion topics appear. Be sure to click on the circle at the bottom right corner last.

Content: Refer to “The Story of Stuff” from Topic 3: Living a Sustainable Lifestyle.” Have a 15-minute discussion on what the teachers believe to be the main causes of global waste. Once the discussion is complete, go over what they said, then use the word on the module.
Consumerism: As the demand for goods increases, the need to produce these goods also increases. This leads to more pollutant emissions, increased land-use and deforestation, and accelerated climate change.

Urbanization: Due to pressure of urbanization most of the cities are growing fast and sometimes they develop beyond the planned limits. Generally, the unplanned areas of the city contain a quarter of the total population, where the spatial information is missing because of non-availability of up-to-date maps.

Overpopulation: Due to increasing industrialization and population large quantities of wastes are being generated in different forms such as- solid, liquid, sludge and gases. Each city produces tones of solid wastes daily from households, hospitals, industry offices, market centers etc.

Plastic:

Make a large emphasis on plastic at the end to transition to the next slide.

https://greentumble.com/the-negative-effects-of-consumerism/


Slide 4:

Suggested time spent: 8 minutes
Instructions: Click on the picture to play the video.

Content: This is a video that tell the life cycle of a water bottle and how water bottles are detrimental to our environment. The video is approximately 8 minutes long.

Slide 5:
Suggested time spent: 5 minutes

Instructions: Click on the water bottle to make text appear.
The invention of plastic in 1907 was considered a breakthrough. Plastic products soon became omnipresent in our daily lives. For many years, we only perceived the benefits of plastic and knew little of the damaging consequences for human health, natural ecosystems and the climate. Plastics are a problem mostly due to their un-biodegradable nature, the materials used for plastic production and the challenges behind properly discarding them.

Plastics are made from liquid petroleum gases, natural gas liquids, and natural gas. And as we know, oil and gas are non-renewable resources, which means that if we don’t find alternatives to fossil fuels voluntarily, we’ll be forced to do so.

Correlations have been shown between levels of some of these chemicals, and an increased risk of problems such as chromosomal and reproductive system abnormalities, impaired brain and neurological functions, cancer, cardiovascular system damage, adult-onset diabetes, early puberty, obesity and resistance to chemotherapy.

Plastic food storage containers are filled with more than just food, they’re chock full of harmful chemicals. Plastics are made from refined crude oil and contain chemicals such as BPA (Bisphenol-A) that function mainly as plasticizers, making plastic more durable and flexible. While this makes plastic very practical for everyday use, it also adds a significant health risk, especially whenever it comes in contact with food. When plastic is used to store or heat a dish, chemicals from the container can leach into the food.

https://superbee.me/dump-the-plastic-why-plastic-is-bad-for-your-health/

https://www.dropbox.com/sh/565l4w6w8bliv2y/AADW1wuce2tTNCGM9A--IKvGa/Sources%20used/Topic%204_Waste?dl=0&preview=Plastic-Pollution-Primer-and-Action-Toolkit.pdf&subfolder_nav_tracking=1

Slide 6:

Suggested time spent: 1 minute
Instructions: Click on the “Microplastics” Icon to direct you to a page on microplastics

Content: Decades of poor waste management policies that saw and continue to see plastic waste being dumped directly into the ocean have led to an international pollution crisis that threatens each of the world’s oceans.

Scientists predict that if nothing changes in our plastic consumption habits, by 2050 there will be more plastic in the oceans than there are fish (by weight).
Instructions:
1. Click on the picture in the center to play the video.
2. Once the video is done playing, click on the icon in the top left-hand corner to bring you back to the page on “Plastic in the Ocean”

Content: When plastics break down due to exposure to water, sun or other elements they can break into tiny pieces - so tiny, most of them cannot be seen with the naked eye. These small plastic fragments are now everywhere. When you drink water, eat fish or other seafood, or when you add salt to your meals, chances are you can also be ingesting tiny pieces of plastic. Microplastics- are a contaminant which is now present in the oceans, water ways, the soil and even in the food that we eat. Once plastic enters the bloodstream of an organism it will never be processed out. The plastic, and the toxins it has absorbed will bioaccumulate as they travel up the food chain to a top predator, often a human.

Return to slide 6:
Instructions: Click on “Sea creatures eat plastic” to direct you to a page about sea creatures eating plastic.

Slide 8:

Suggested time spent: 3 minutes

![Image of plastic bags and a pelican]

Instructions: Click on the plastic bags to see whether the answer chosen was correct. When the game is done being paid, click on the icon in the top left-hand corner to return to the “Plastic in the Ocean” page.

Content: Sea creatures eat or get ensnared in plastic debris and can be killed or maimed. Plastic that is consumed by marine organisms, as well as the toxins they absorb from the water, accumulate up the food chain making seafood potentially dangerous for humans as well.

In 1998, a pelican was found dead in Kiama, Australia after eating 17 plastic bags. The pelican presumably thought the plastic bags were food. The pelican was preserved and named Pete. Since then he has been standing in front of a sign at Fitzroy Falls that informs visitors of how he died and the problems of plastic bags and ocean pollution.


Return to slide 6:
Instructions: Click on “Sea creatures eat plastic” to direct you to a page about sea creatures eating plastic.

Slide 9:

Suggested time spent: 4 minutes

Content: Around the globe there are five massive patches of marine plastic. These huge concentrations of plastic debris cover large swaths of the ocean; the one between California and Hawaii (In the United States of America) is almost the size of Namibia.

Slide 10:
Instructions:

1. Click on the icons to make other icons appear.
2. Once all the icons have appeared, click on the bottom center of the page to make text appear.

Content:

Air Pollution: Production of plastic causes a lot of air pollution. High levels of air pollution can cause an increased risk of heart attack, wheezing, coughing, and breathing problems, and irritation of the eyes, nose, and throat. Air pollution can also cause worsening of existing heart problems, asthma, and other lung complications.

Soil Contaminations: Land and soil pollution has substantial consequences for humans, animals, microorganisms and aquatic life. Contaminated land and soil can cause various problems on the skin, respiratory problems, and even different kinds of cancers. These toxic substances come into contact with the human body directly through eating fruits and vegetables that have been grown in...
polluted soils, being consumed through drinking water that has been contaminated, direct contact with the skin, and breathing in air polluted with particles and dust.

Acid Rain: Acid rain contains high levels of nitric and sulfuric acids that are created by oxides and sulfur oxides released into the air by the burning of fossil fuels. Acid rain damages trees and acidifies soils and water bodies, making the water too acidic for fish and other aquatic life.

Flooding: Oftentimes, garbage that is not properly disposed enters into drainage systems and clogs drains. This obstructs the free flow of the water that enters these drains causing water to back up during rainfall flooding the surrounding area. A buildup of garbage can also obstruct the natural flow of water in rivers and streams.

Water Contamination: The effects of water pollution depend on which chemicals are being dumped where. Bodies of water that are near urbanized areas tend to be heavily polluted by dumping of garbage and chemicals, both legally and illegally, by industrial plants, health centers, and individuals.

https://www.renewableresourcescoalition.org/pollution-causes-effects/

http://www.odpm.gov.tt/node/16
Subtopic: The Local Waste Crisis

Slide 11:

Suggested time spent: 3 minutes

Instructions: Click on the location icons to make the name of the cities appear. Be sure to click on the on center location icon first. The order of the other icons does not matter.

Content: There are only five recycling centers in Namibia. The recycling centers are Rundu, Swakopmund, Walvis Bay, Windhoek, and Oranjemund.
Content: Here is an example of a landfill in Namibia and what kind of waste it has. Apart from the disposal of garden waste and building rubbles, general and hazardous wastes are disposed of at a specially engineered landfill site known as Kupferberg that is located about 11 km from the city centre. At this site, two separate cells are used for waste disposal. The general wastes generated from households, commercial and industrial activities are disposed of in the general cell; while the hazardous wastes are disposed of in the hazardous cell. To prevent any leakage of leachate from contaminating the soil and ground water, the site is lined with some layers. This study has found that roughly an amount of 229.48 kg of the general waste was disposed per capita per year in 2008, while the amount of hazardous waste disposed per capita per year was 16.8 kg. The diagram presents the fractions of the recyclable materials being disposed of at Kupferberg, compared with the amount of nonrecyclable materials.

Content: A major cause of waste and pollution in Namibia is littering. Here is one example of the negative effects that can be caused from littering. What are some other negative effects of littering?
Subtopic: What Can We Do?

Slide 14:

Suggested time spent: 30 seconds
Content: The best way to stop the waste crisis is to reduce waste and conserve materials. It is important that everyone tries their best to do the things at the top of the zero-waste triangle.
Reducing the Waste: Reduce, Reuse and Recycle

Reduce  Reuse  Recycle
Instructions: Click on the reduce icon to go to a page about how to reduce waste.

Slide 17:

Suggested time spent: 10 minutes

Instructions: Click on different items with the kitchen to make a new item appear. There are 6 clickable items in the kitchen.

Content:
Water bottle: Instead of buying plastic water bottles, use a reusable water bottle.

Plastic bag: Use reusable shopping bags when going shopping instead of non-renewable plastic bags.

Trashcan: Compost all your food waste instead of throwing it into a trashcan.

Paper towel: Use a towel instead of paper towels to reduce waste.

Produce container: Avoid buying produce that has extra packaging.

All these methods are examples of how to reduce waste in the kitchen. How else can you reduce waste in the home?

Slide 18:

Suggested time Spent: 2-4 hours
Fire Bricks:

1. First, get yourself a stack of scrap paper. Newspapers, paper plates, napkins, cardboard, shredded paper from the office, $100 bills…
2. Then, take those and soak them in a bucket of water until they’re saturated. Letting them sit for quite a while so the fibers can break down.
3. Once you have them all nice and soppy, shred them up with something. A blender could work well
4. Now it’s time to press your paper fire bricks. Any kind of multi-holed receptacle with a follower will work. Throw in a good portion of shredded paper. Then press hard and get that water out as much as possible, then put the brick somewhere to dry.
5. Once dried, they’re ready for use… then the ashes can be used to add calcium and alkalinity to the garden.

https://thegrownetwork.com/make-recycled-paper-fire-bricks/

Reusable plastic bags:

**What you'll need**

- Plastic bags (thin, flimsy ones work best)
- Parchment paper, freezer paper or plain old copier paper
- Iron (and your favorite ironing surface)

**Making it**
1. Flatten out the bag and trim the bottom seam and handles off. This allows the bag to be opened into a larger rectangle of plastic.

2. Turn the bag inside-out if it has printing on it. Once the ink heats up, it comes off the bag and makes a huge mess. If the bag has an interesting design that you'd like to preserve, try using a clear plastic bag layered on top of the printed one.

3. We find that between 6-8 layers of plastic gives the best results. So, you can either fold your bag twice until it is 8-ply thick or use three or more bags layered on top of one another. Trying to fuse less than 6 layers often results in little holes forming in the finished piece and a generally weaker material.

4. Sandwich your plastic bags between the parchment paper and run a hot iron (we set ours to "Rayon", but you will need to experiment a little to see what works for you) and keep the iron moving constantly. Make sure to get the edges, and after about 15 seconds, flip it over and iron the opposite side for a few seconds.
5. Peel a corner of the paper back to see if the plastic is fused together. It should be smooth and "one sheet" to the touch (watch out, it's a little hot). If the layers are not all melted together, iron it some more.

6. Peel the parchment paper away from the finished plastic sheet. Voila. Now, you can use this stuff to make a million things. We've made re-usable grocery totes, wallets, and floor cushions; I think it's an inexpensive way to make waterproof linings for beach bags and makeup clutches.

https://www.popsugar.com/home/DIY-Fusing-Plastic-Bags-537750

Planter Using Upcycled Wine Bottles:

Materials needed to cut glass bottles:

- Some cotton twine/string
- 1 Glass bottle (the thinner the walls of the glass bottle, the better)
- Acetone (Most commonly found in nail polish remover, but also in the paint section at your local home centers)
- Scissors
- Some form of abrasive paper (I used an emery board)
- Sink filled with cold water (The colder, the better. I used ice, which helped to have cold water)
- Igniting source, such as a long BBQ lighter
- Wine bottle

Step-by-step instructions to cut glass bottles:
1. Wrap 5 or 6 times the cotton string around the bottle
2. Tie and cut loose ends of the cotton string
3. Remove the cotton string and soak it in acetone
4. Slide back the cotton string onto the bottle where you want it to break
5. Light cotton string on fire
6. Turn the bottle continuously to burn the cotton string evenly
7. Keep the glass bottle bottom tilted up to trap hot air inside the bottle
8. IMPORTANT: don't breathe the gases and don't catch anything else on fire. Do it above a sink like in the video.
9. When the flame starts to go out, plunge the glass bottle into cold water
10. Optional: It's a good idea to sand the broken edge of the bottle to avoid any injuries.

You cannot use soil as the planting medium, but you can use moss/peat moss. Use wire that you can decoratively wrap around the neck of the bottle, or a pretty rope to suspend the air planter.

https://www.recyclart.org/2012/02/diy-easy-cut-glass-bottles/
Make Your Seed Pots

Materials:
- a collection of toilet paper rolls,
- scissors,
- light potting soil,
- seeds
- waterproof container

Instructions:
1. Cut the toilet paper roll in half
2. Make four cuts in the roll, 1/3 of the way up
3. Fold the cut area on the bottom like you would close a box
4. Fill your new seed pots with a light potting soil, pack it down with your thumbs
5. Place the planted pots in a watertight container and give them a good watering. You want to completely soak the paper roll and keep it wet the whole time you are growing. Go lightly with the water though, you do not want them to sit in water, just to be wet. If the paper roll dries out, it will wick water from the soil.
6. Place your container in a plastic bag or cover it with a clear plastic wrap. The purpose of the cover is to create a small greenhouse, trapping in the moisture, until the seeds sprout. Keep an eye on your seedlings and spritz with water if it becomes necessary.
7. Take off the plastic once your seeds have all sprouted and reach the top cover. They will need air circulation, otherwise the toilet paper seed pots may mold. Place your seed tray in a south facing window so they will get sun.
8. Once the seeds have sprouted and are hardened off, these toilet paper seed pots can be placed directly in the ground and will compost away. Make sure that when you plant them they are completely covered with garden soil.

https://preparednessmama.com/toilet-paper-seed-pots/
Instructions: Click on an item and drag it to the recycle bin. If the item is correct, the item will disappear. If the item is incorrect, it will shoot back out to its original spot.

Content: Not everything that is recycle is necessarily recyclable in Namibia. Guess which items you think can be recycled in Namibia.
Slide 10:

Suggested time spent: 5 minutes

Instructions: Click on the item to make text appear.

Content:

Pizza box: Pizza boxes are made from corrugated cardboard; however the cardboard becomes soiled with grease, cheese, and other foods once the pizza has been placed in the box. Once soiled, the paper cannot be recycled because the paper fibers will not be able to be separated from the oils during the pulping process.

Styrofoam: The technology to recycle Styrofoam cups does exist.

Batteries: Batteries can't be tossed in your regular recycling bin because they contain highly toxic chemicals.

Mirrors: Mirrors have a reflective coating painted on the back of the glass, so you can see your reflection. That coating makes the glass nearly impossible to recycle. Mirror glass is also a hard thing for recyclers to do anything with.
Aluminum foil: Aluminum foil is just as recyclable as aluminum cans, but some recycle programs aren't equipped to process foil. Aluminum foil is many times covered in food scraps and most recycling facilities won't accept food covered items. Also, smaller aluminum foil scraps can clog the recycling equipment.
The Ministry of Environment and Tourism (MET) has recognized the urgent need to improve solid waste management in Namibia. This National Solid Waste Management Strategy is important to ensure that the future directions, regulations, funding and action plans to improve solid waste management are properly coordinated and consistent with national policy, and to facilitate co-operation between stakeholders. The Vision of the Strategy is for Namibia to become the leading country in Africa in terms of standards of solid waste management by 2028.
The Specific Objectives of the Strategy are:

1. To strengthen the institutional, organizational and legal framework for solid waste management, including capacity development.

2. To install a widespread culture of waste minimization and to expand recycling systems.

3. To implement formalized solid waste collection and management systems in all populated areas, including under the administration of Regional Councils.

4. To enforce improvements in municipal waste disposal standards.

5. To plan and implement feasible options for hazardous waste management; (includes healthcare waste management).


Slide 23:

Suggested time spent: 4 minutes
The Schools Recycling Project, now in its 6th year, is the highlight on the RNF’s annual calendar.

Schools in Windhoek, at the coast (Swakopmund, Walvis Bay and Henties Bay) as well as in the north are encouraged to participate in this competition, where they are not only in line to win a cash prize for their recycling efforts, but also are rewarded for the recyclables collected.

Four bay stations are made available to schools and educational institutions, and RNF partner Rent-a-Drum services and keeps track of the recyclables collected by the respective schools.

The competition started in 2009 with 10 participating schools – and a mere 15kg per learner collected. The competition grew and now sees around 50 schools participating annually:

- 2014 30 kg per learner – and a total of 114 tons for the year
- 2015 98 kg per learner and a total of 153 tons
- 2016 179 per learner and a total of 90 tons
- 2017 222 kg per learner total of 128 tons
- 2018 275 kg per learner with a total of 133 tons

The Recycle Namibia Forum (RNF) was established as a non-profit membership organisation on 7 June 2011 with the purpose of coordinating projects to promote recycling, and the reduction and reuse of so-called waste in Namibia.

The Recycle Namibia Forum is the result of Namibians who decided to support various environmental projects that were started in an informal way when Namibia Breweries Limited, City of Windhoek, Rent-A-Drum, Collect-a-Can, 4H-Namibia, Plastic Packaging and Nuevas Ideas Consulting decided to promote and support activities that promote environmental integrity.

What later became the Recycle Namibia Forum formally addresses waste in terms of Reducing, Reusing and Recycling and all other environmental matters relating with these issues within Namibia.

The purpose of the RNF is to inspire the nation to join hands today for a cleaner Namibia tomorrow. Committed to a cleaner Namibia; Doing the right thing; Inspiring a cleaner future; Embracing new concepts; Standing together. A Namibian network promoting effective and sustainable waste management. Engage 1000 individuals annually with targeted initiatives; % increase on receiver rates on the baseline per annum; In depending fund one project / research article by 2021

Content: The President’s call to Clean up Namibia on Saturday, 25 May 2018, saw a united effort across the country to do so.

The RNF and its members played a vital role in this large-scale campaign, with more than 500 000 refuse bags and clear bags sponsored by Plastic Packaging, logistical support by Rent-A-Drum, Kleen Tek Waste Management, Scrap Salvage and Erongo Drum, as well as a large supply of bottled water and refreshments by Ohlthaver & List and Coca Cola Namibia. In the capital, the City of Windhoek’s Waste Management division was on hand to assist with removing the collected refuse and recyclables.

Instructions: There are three subtopics. Start with the first topic which is: Starting with “me” clicking on the topic title which will direct you to the first page of this subtopic.

Content: Go over the topics to be covered.
Page 2: Starting with “me”

Starting with "me"

What can I do?

Individually  Socially  Globally

Instruction: Discuss the what you can do individually, socially and globally to make the world a sustainable.

Page 3: Video-Severn Cullis-Suzuki at Rio in 1992

Instructions: Click on the image to make the video of Severn Cullis at Rio in 1992 play

Content: This is a video of a 12 year old girl who silenced the UN for 5 minutes. This speech is about a girl who presents an environmental protest to the UN in 1992 at Earth Summit in Rio Centro. She emphasizes about the importance of the nature and the animals and how we are destroying the planet.

Page 4: Video-Severn Cullis-Suzuki at Rio in 2002
Instruction: Click on the image to make the video of Severn Cullis at Rio in 2002 play. After watching the two videos, discuss about the points made in the video. Suggested topics include: current environmental problems and how to address them.

Content: A video of Severn Cullis-Suzuki return back to 2002 UN Rio conference twenty years after her initial visit at Rio.

Page 5: Why is Nature Important?

Instruction: Discuss about the different aspects of Nature.

Content: The important of nature has been directly and indirectly been addressed in the past four module topics. Ask the audience to explain the importance of nature to them. Build on their ideas and connect it to the three pillars of sustainability.
Content: Here are some contribution of Nature to Namibia. The variety of natural resources found in Namibia serve as a source of income to Namibia. The money generated from tourism and nature is then used to run municipalities such as public hospital, schools, roads etc. It can be observed that the environment of Namibia (Epupua Falls, Orange River, etc) contributes to the economy of Namibia which is then used to build the social aspect of life (Hospitals, schools, roads, etc) This is related to the three pillars of sustainability. The three pillars of sustainability are shown in the next slide. Use the next slide to conclude the discussion about sustainability.
Page 7: The Three Pillars of Sustainability

Content: Use this slide to conclude the discussion about sustainability. Focus on the idea only the balance between the planet, people and profit can create a sustainability.

Page 8: Let us protect Mother Earth

Content: Let us protect Mother Earth. Nature gives us everything for free. Nature does not charge us any money. All nature asks of us is that we protect it.
Content: All we that we receive from nature is free. All nature asks of us is that we protect it. Page 9: Introduction slide of Good Life Goals

Instruction: Introduce the good life goals

Page 10: What are the Good Life Goals?
Instruction: Discuss about the good life goals. Build on the introduction made on the previous page.

Content: The good life goals represent an effort to answer this question and help a global audience to recognize the vital role of individual action in achieving the SDGs.

Page 11: Video- The Good Life Goals

Instruction: Click on the video to play a brief overview of the good life goals
Page 12: Discussion about the good life goals

Instructions: Discuss the good life goals and the actions associated with them.

Click on the good life goal emoji to go to the description page to view more detailed actions

Page 13-31: Good life goal actions

Instructions: Click on the page back button to return to the main good life goal page. Discuss the action or goals associated with each SDGs.
Page 30: Video: Could This Change the World

Instruction: Click on the image to view a video concluding the good life goals and the impact of our actions

Content: Start living the good life goals. Everyday actions to help make the sustainable development goals happen
Appendix J: Pre and Post Assessment

**Topic 1:**
1. Write the definition of Sustainable Development?
2. Which organization created the Sustainable Development Goals (SDGs)
   a. UNESCO
   b. UN
   c. WHO
   d. None of the above
3. What are the three pillars of sustainability?
4. Where is Education for Sustainable Development (ESD) located in Sustainable Development Goal 4?
5. Of the following, which would be considered the most environmentally sustainable?
   a. Recycling all recyclable packaging
   b. Reducing consumption of all products
   c. Buying products labeled "eco" or "green"
   d. Buying the newest products available
   e. Not sure

**Topic 2:**
1. Write the definition of energy efficiency.
2. Write the definition of renewable energy.
3. List 3 energy sources (renewable or nonrenewable) used in Namibia and describe how it’s used.
4. Which light bulb is the best to use in the home? Justify your response.
   a. Incandescent bulb
   b. LED bulb
   c. CFL bulb
5. What unit(s) do we use to measure energy?
6. List 2 impacts that non-renewable energy can give to Namibia.

**Topic 3:**
1. What are three challenges of supplying water in Namibia?
2. What are your four basic needs?
3. What are three of the five local water uses in Namibia?
4. What are four ways to eat sustainably?
5. What is consumerism?

**Topic 4:**
1. List at least three major causes of the global waste crisis.
2. Name one system of the human body that can be affected by the chemicals in plastic.
3. How many great garbage patches are there?
   a. 3
   b. 9
   c. 2
   d. 5
4. List one example of an item that cannot be recycled in Namibia and why it cannot be recycled.
5. What is one goal of the Recycle Namibia Forum?
6. List two of the five recycling centers that exist in Namibia.

**Topic 5:**
1. Write one idea for each of the following that you can do to start living sustainably:
   a. Individually,
   b. Socially
   c. Globally
2. Why is Nature important?
3. Write one way to start protecting our nature.