Indigenous knowledge: A route to the infusion of sustainable development in education.

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Student ID no.: 800080315

Degree: (check one) Master's Doctoral

Title of Dissertation: Indigenous Knowledge: A Route to the Infusion of Sustainable Development in Education

Date of Graduation (Month Year): June 2019

School and Department: Graduate School of Education
Department of International & Comparative Education

Thesis Advisor: Dr. Heba El Deghaly

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Dr. Atta Gebril  
IRB chair, The American University in Cairo  
2046 HUSS Building  
T: 02-26151919  
Email: agebril@aucegypt.edu
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Student Full Name: Ekbal Mohammed Mokhles
Student ID: 800080315
Thesis Title: Indigenous Knowledge: A Route to the Infusion of Sustainable Development in Education

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Thesis Supervisor:
Name: Dr. Heba El Deghaidy
Title: Interim Dean
Department: International & Comparative Education
Institution: AUC
Signature: ___________________________ Date: ___________________________

First reader:
Name: Dr. Malak Zaalouk
Title: Professor of Practice & Director of MEIHE
Department: International & Comparative Education
Institution: AUC
Signature: ___________________________ Date: ___________________________

Second reader:
Name: Dr. Mustafa Toprak
Title: Assistant Professor
Department: International & Comparative Education
Institution: AUC
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Indigenous Knowledge: A Route to the Infusion of Sustainable Development in Education

A Thesis Submitted to

The Department of International & Comparative Education

in partial fulfillment of the requirements for the degree of

Master of Arts in Teaching and Learning.

by

Ekbal Mohammed Abdel Salam Mokhles

under the supervision of

Dr. Heba EL-Deghaidy

Spring 2019
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Abstract

Indigenous knowledge is the unique knowledge confined to a particular community, produced in order to cope with agro-ecological and socio-economic environments. The purpose of this study is to explore the perceptions of some educators around the issue of infusing indigenous knowledge embedded in communities such as Nubia in their school curricula similar to what other models in indigenous communities in countries such as Hawaii, Brazil and Australia did to reform their curricula. The research is based on the assumption that a culture- and place-based learning in Nubia can promote the infusion of indigenous knowledge. Foucault’s theory of power and knowledge relation is adopted to show how indigenous knowledge could be viewed as a tool of empowerment to indigenous, ‘colonized’ communities contributing to sustainable development. Nubians, within the framework of this theory, could be seen as colonized people seeking a space to practice their teachings and traditions. Unfortunately, this kind of space is denied in Egypt because Nubian students are subjugated to academic practices created by the ‘colonizing’ public education system that refuses to absorb their local culture and heritage. This study uses a qualitative research design. Interviews with university professors, students and their parents on the possibility and means of integrating indigenous knowledge into curricula were conducted. There were 20 participants that included ten Nubian students, five Nubian parents of the same students and five academics in three different private universities in Egypt. Data from the interviews were analyzed based on Creswell’s suggested steps for data analysis in qualitative research. The results indicate high perceptions of the importance of indigenous knowledge and the possibility of integrating it into curricula. The research indicates that the application and approaches towards education for sustainable development still need more thorough investigation in Egypt. Further attention should be given to integrating place-based learning and hands-on experience into educational curricula to encourage students to adapt to situations similar to those in real life.
1. Introduction

1.1 Background

It is noted that higher education institutions are the cornerstone of any knowledgeable society (Kearney, 2009). Moreover, the most crucial element, which contributes to developing any nation, is the quality and effectiveness of higher education offered to students. Developing countries should pay considerable attention to reforming their education system, in particular, their higher education in order to be ranked among developed countries (World Bank Group, 2014). However, higher education in Egypt suffers from lack of quality due to many reasons, mainly, inadequate teachers and poor conditions of schools. Most Egyptian school students lack the basic skills in reading and math, and most graduates are not well-equipped with the knowledge, skills, and abilities required by the labor market (El Bedawy, 2014). In 2005, Egyptian universities were excluded from the list of the best 500 universities all over the world (Belal, Briggs, Springuel & Sharp, 2009). Quality education in this context is defined as an education that serves each child pedagogically and developmentally. It should be well-structured, should involve all students regardless of their economic status or location, and should encompass cultural differences and peculiarities. However, formal education systems typically exclude experiences of marginalized people and prescribe a dominant universal perspective with which all groups are to comply to. The exclusion, limited use, or lack of awareness of indigenous pedagogical approaches in educational systems and teacher education programs continue to be a significant factor in perpetuating the educational inequalities that exist for First Nations peoples. A best example for excluding marginalized groups from quality education is the situation of Nubians as an ethnic marginalized group in Egypt (Janmyr, 2017). The deterioration in the Egyptian education system has resulted in intellectual, economic, political and social stagnation that has reflected on teaching and learning practices in general. The Nubians, a non-Arab Muslim population who lived in the geographical region known as Nubia in southern Egypt and northern Sudan, are an example of that kind of deterioration. The public education system in Egypt has for too long overlooked the Nubians, a matter which has led to lack of awareness among the Egyptians about the identity and history of that nation. This on the long term can result in the gradual
disappearance of the Nubian culture which is a significant part of the Egyptian culture as a whole. Equally important, is that negligence of the Nubian culture can affect the quality of education in Egypt, since quality education in this study is defined as an education that serves each child regardless of their economic status or location. The construction of the Aswan Dam Lake which was completed in 1970 has swamped their villages; the decrease in land availability has led to the immigration of males to cities such as Aswan, Assuit, and Cairo. Although the new reservoir has benefited Egypt by providing power and controlling floods, it required the relocation of nearly 100,000 residents and some archaeological sites; thus, the Nubians were mostly affected by the dam. All Nubian lands within Egypt and about one-third of the Sudanese Nubian Valley were completely flooded which left Nubians and those Sudanese affected by the new lake with no choice except to leave their homeland (Fahim, 1983). The Nubian resettlement to Kom Ombo (New Nubia) in 1963-64, a district belonging to Aswan governorate ‘created a number of stresses associated with the move itself such as shifts in agricultural styles, food and water problems, and the general upheaval of the social structure’ (Fahim, 1983, p. 66). According to a paper entitled “Contemporary Egyptian Migration: An Overview of Voluntary and Forced Migration”, it is mentioned that the Nubians have always felt that the dam severely disturbed their traditional life and placed them, against their will, in an uncertain situation (Zohry & Harrell-Bond, 2003). Their living conditions were horrendous; Nubians were not only deprived of their homeland, but also from their basic rights to have better health care and education. After the 25th January Revolution, former Prime Minister Essam Sharaf gave orders for establishing The High Institute for Reconstruction South of the High Dam. Since then, the project has remained on paper only and was never executed. Over the years, foreign attempts to invest in the Nubian homeland have been largely unsuccessful; nevertheless, Nubians believe that if they are granted the right to return to their homeland, they could develop it. Nubian activists explicitly have referred to a ‘Process of de-Nubianization, which includes resettling Arab groups in the lands to which Nubians wish to return and restore. Giving Arabic names to the lands and places that they have inhabited in the past was an indirect way to deprive them from their indigenousness which is also reflected through biased educational curricula at the expense of the Nubian own languages and culture. Moreover, Nubians were not granted adequate political representation in the Egyptian government; and finally, the government was not upholding the obligation to
protect Nubians from discrimination (Janmyr, 2017). Nubian language has never been taught within the Egyptian education system after resettlement; the language of instruction in the newly built schools was exclusively Arabic which was recognized in the 1971 Constitution as the only state language. The case of the Nubians could be portrayed easily through their image in the Egyptian media and movies, which often presents Nubians as doormen, servants or drivers. Nubia is a very rich country with its people, resources, its distinguished culture and traditions, which would help in boosting the idea of relating education to the environment by means of implementing education for sustainable development. This means that education that is implemented in Nubian educational institutions should be rooted in their indigenous knowledge; such education would promote creativity and ingeniousness elicited from environment awareness and would foster the cycle of development. Thus, education for sustainable development predetermines a sort of literacy that aims at improving and maintaining the quality of life for future generations by teaching individuals how to act and live sustainably (Wade, 2014). ESD represents a new vision of teaching and learning, a vision that helps people reconnect with nature, by addressing “the complexity and interconnectedness” of sustainability issues such as poverty, peace and international understanding, sustainable consumption and production, environmental degradation, climate change, water protection and health (UNESCO, 2010).

1.2 Problem Statement

Nubians are marginalized, and their minority status made them mostly excluded in any functional contribution to any actionable strategic plan in the Egyptian society. Education in Egypt is considered the most challenging field that needs radical change, hence many plans were set to enhance the standard of education; however, Nubian culture is not included in these new strategies.

According to UNESCO (2010) and the Ministry of Education in Egypt, the ultimate purpose of education is to enhance learning experiences for students. All students have the right to a quality and equal education that caters for the individual educational, cultural and developmental needs. However, the current situation of education in Egypt has been in dire need for building competencies and mobilizing human potentials in order to support the development and prepare students for the future. According to the 2014 Constitution, the rights of freedom, human dignity and
social justice are rights that should be guaranteed to every citizen. Yet, Nubians have been persistently excluded from their right for education in their own language and denied their indigenousness.

Thus, amidst the rapid global change and increasing multi-dimensional production of knowledge, it is crucial to face the range of challenges affecting the demographics and culture, especially, in remote areas such as Nubia in order to achieve the highest rates of sustainable development in the field of education. Therefore, relating education to the culture of the place could be an effective solution to fostering sustainable development of the Nubian community.

1.3 Purpose of the Study

The purpose of this study was to investigate the possibility of implementing SD in education to distinctive rural areas. This study explored the perceptions of some educators around the issue of adapting the structure of school curricula in some countries with indigenous communities such as Hawaii, Brazil and Australia as models in order to alter and reform education in Egypt by using indigenous knowledge from Nubia. The research is based on the assumption that a culture- and place-based learning in Nubia can promote IK in the framework of SD.

1.4. Research Questions

The research addressed the following questions.

1. What are the perceptions of Nubian stakeholders towards IK?
2. What are the practical steps for shaping the future of higher education in Nubia that would cater for their indigenous knowledge?
3. What are the challenges, which may hinder the effectiveness of reconstructing of the higher ESD curriculum for the Nubian students?
2. Literature Review

The following chapter gives an insightful demonstration of literature review on indigenous knowledge and its impact on higher education. The focus is placed on the infusion of sustainable development into various curricula through articulation of the experiences of three different countries of same circumstances as Nubia, namely, Hawaii, Australia and Brazil.

The purpose of this literature review is to explore how the current research tackles the problem of ESD and its implications. It is undeniable that the quality of the lives of people and their future depend on their capability of adapting and learning. Learning is crucial, as it is what makes the development sustainable. Only involving all the stakeholders and providing them with the opportunities of relevant learning can and should secure sustainability as a long-lasting process. This research assumes that proper education is the only effective instrument capable of ensuring the above, in contrast to the policy instruments that are temporary and end as soon as the policy is withdrawn. It is expected that the existing studies can serve as evidence that education empowers, and both builds and enhances sustainable change improving the quality of life of the relevant stakeholders. It is especially important for the indigenous peoples’ communities that are often excluded from the sustainable development process remaining just passive objects of change.

2.1 Indigenousness

The concept of indigenousness is central to this research. First, it is important to define Indigenous People. According to *The United Nations Declaration on the Rights of Indigenous Peoples*, indigenous people are described as being among the world’s marginalized and disadvantaged people that live in different parts of the world from the Arctic to the South Pacific; their number reach to more than 370 million in about 90 countries (Coates, 2014). Indigenous people form about five per cent of the world’s population, and they are categorized among the world’s extremely poor (Coates, 2014). According to *The United Nations Declaration on the Rights of Indigenous Peoples*, indigenous is a term that does not have one agreed-upon definition (Coates, 2004). Nevertheless some features have been provided by the United Nations to illustrate the term indigenous: self-realization as indigenous nations, attachment to their original land,
different sets of traditions and beliefs, distinct languages, and unique cultures. Among the significant features of indigenous people is that they retain their original political, social and economic practices that are distinct from those of the dominant culture. Moreover, the knowledge of indigenous people, if taken out of its socio-cultural context, can be subject to misunderstanding and misinterpretations (Smith, 2004; Sillitoe, 1998). This leads to the conclusion that it is hard to expect any evident progress in either education or well-being of indigenous people by enforcing on them colonizing methods of teaching with the purpose of assimilating and blending them into the society. It is hard to expect that such indigenous people would consciously contribute to both sustainable life around them and their own development as what they learn lack connection to their context and needs. Researchers have attempted to find a common and universal definition of “indigenous people” which would be able to embody the cultural diversity of the various indigenous communities all over the world. According to Cobo (1986), indigenous communities see themselves different from the societies now living on their lands. Quite aware of their marginalized reality in the modern societies, indigenous people are so keen on passing on their language, traditions and heritage from one generation to another as a form of defending their own existence (Cobo, 1986).

According to a study by Fontaine (2012), one of the main reasons for the persistent damage and marginalization of indigenous people is the lack of well-resourced quality education that is relevant to their learning needs, languages, priorities and aspirations, and which is delivered in culturally suitable settings through culturally proper teaching strategies. Apparently, inadequate education available to indigenous peoples is not only inappropriate, but also threatens their existence and identity. Education policies are usually used as a means to systemically distinguish indigenous peoples in an attempt to integrate them into society, which led to the destruction of their culture, language, identity, and displaced them of their lands, and natural resources. These education systems, policies and curricula are rarely developed with indigenous peoples’ contribution or approval; as a result, it has deprived indigenous children from vibrant life opportunities and cultural security. Moreover, owing to the significance of lands and natural resources to the inhabitants, cultural knowledge and well-being of indigenous peoples are also interconnected to education, where elders pass down knowledge about the land, history, values and language to new generations. Therefore, the right to education is connected to all other
human rights of indigenous peoples, including land rights. Sad examples of Nubians, Australian aborigines and many other indigenous people around the world are a vivid proof. In Egypt, for example, deficiencies in the education system hinder the country’s economic growth and contribute to socio-economic inequality. No country can achieve sustainable economic growth without investment in human capital. The keyword here is ‘Education’; it enhances the quality of life and promotes development. Education positively increases the level of knowledge and information, which, in turn, elevates levels of critical thinking and moves onward the cycle of economic growth (Ozturk, 2001).

According to UNESCO, the education policy in Egypt is in dire need for building competencies through applying the principles of ESD to support development and prepare students for the future (Wals, 2012). Moreover, UNESCO also declared that education in general is unfortunately outdated and ignores the importance of the culture of the indigenous people when related to the curricula taught. At large, curricula lack the linkage between what is really needed in the market and what is being taught, which is considered a real threat to any means of infusing sustainability (Wals, 2012; Glasson, Mhango, Phiri, & Lanier, 2010). Indigenous people should be active agents to be able to pass their knowledge to the younger generation to preserve their culture and language. If indigenous knowledge does not include social and cultural aspects, it would not be beneficial and may lead to reverse actions (UNESCO, 2010; Sillitoe, 1998).

Moreover, it is worth noting that among the most important dimensions that indigenous communities worldwide consider key to their survival are the rights to land, culture and self-determination (Tauli-Corpuz, 2005). Furthermore, indigenous peoples have the right to individual and collective education as specified in the “UN Declaration on the Rights of Indigenous Peoples” (2007) and in the ILO Convention Number 169 on the Rights of Indigenous and Tribal Peoples (C169, 1989). Therefore, it could be noted that indigenous knowledge is considered part of everyday life, since it is interconnected with language, culture, health, well-being, security, human identity, freedom of expression, environment, and economic growth. Hence, the integration and infusion of indigenous knowledge in education would lead to a sustainable future.
2.2. Definition of Indigenous Knowledge (IK)

Indigenous knowledge, also known as local knowledge, folk knowledge, or traditional science, is the unique knowledge confined to a particular culture or society. This knowledge is produced and passed on from one generation to another in order to get along with their own socio-economic environments. Moreover, indigenous knowledge includes securing enough food, strengthening family ties, increasing care among community members, expressing identity, and preserving the environment against different hazards (UNICEF, 2010). As stated in *The Principles and Guidelines for the Protection of the Heritage of Indigenous Peoples*, indigenous knowledge is a “complete knowledge system with its own concepts of epistemology, and its own scientific and logical validity” (Battiste, 2002, p. 7). Brouwers (1993) explains, that it is produced through an organized process of observing local conditions, trying different solutions and readapting previously found solutions to new environmental, socio-economic and technological situations (as cited in Senanayake, 2006). According to UNESCO (2010), indigenous knowledge denotes the concepts, skills and approaches adopted by communities with close relationship with their natural surroundings. Importantly, for indigenous peoples, local knowledge feeds decision-making about basic aspects of daily life. On the other hand, as a result of modernization, there is virtually no indigenous knowledge in many countries; cultural heritage is now limited to physical cultural heritage such as monuments, historic and ancient structures while ignoring the non-physical – heritage, such as language and culture. Therefore, it is crucial that the notion of culture should be redefined to include eco- indigenous knowledge and preserving indigenous languages especially that both are transmitted orally from one generation to the other as in the case of the Nubian language.
2.3 Means of Transmission of Indigenous Knowledge

Anthropological studies on the transmission of culture, the human mode of information transmission through symbolic communication have focused on values, personality traits, and attitudes, “rather than the mundane details of the transmission of practical skills and knowledge” (Ohmagari & Berkes, 1997, p.199). “Transmission” refers to the process of passing on cultural aspects from one person to another Knowledge transfer is defined as one-way kind of communication of knowledge, which takes place between individuals, or groups where the knowledge receiver is able to grasp, employ, and use the knowledge. The transmission process is subject to a wide variety of communication modes from one individual to another (Wilson, Ward, & Fischer, 2013). According to Child and Rodrigues (1996), the types of knowledge that could be transferred are categorized into embraced, embodied, cultured, embedded and encoded. The characteristics of embraced knowledge are mainly dependent on conceptual skills and cognitive abilities. Embodied knowledge is action-oriented knowledge that is based on the social acquisition and the way a person connects and responds to their environment. Cultured knowledge is socialization, which acts as a medium during the process of obtaining shared understandings while embedded knowledge is related to the relation between roles, technologies, formal procedures and emergent routines within a complex system. Encoded knowledge is the information that makes use of the signals as communication and then breaks them into codes of practice. The process of knowledge transfer starts from defining the knowledge holder within a specific community and encouraging them to communicate the knowledge after choosing the sharing mechanism in order to execute the transfer plan smoothly. After measuring to ensure the transfer took place, the knowledge should be applied before the last steps of monitoring and evaluation (Narteh, 2008). Indigenous knowledge is transmitted from generation to generation within the same community, family members such as parents, grandparents and older siblings are responsible for transmitting skills and values to the individual either through word of mouth, by the use of storytelling, myths narration (Sillitoe, 1998), metaphors (Marika et al., 2009), songs (Battiste, 2002), or simple teaching practices. Therefore, the preservation of indigenous languages is crucial to the survival of indigenous knowledge, which sometimes occurs through traditions learned from informed experiences and practical demonstrations, such as rituals and ceremonies (Sillitoe,
1998) or symbols and artworks (Battiste, 2002). It should be noted that knowledge transfer is not a homogenous process, since it is influenced by factors such as age, gender, experience, political power, and occupation, which may generate different knowledge systems within the same community as well as affecting the quality and quantity of indigenous knowledge possessed by a person (Briggs, 2005; Sillitoe, 1998). O’Donoghue and Russo (2004) have designed a model that regards sustainability as a socio-political issue in which community elders contribute to acknowledging indigenous methods of living with nature; this model includes democracy, human rights, economics and bio-physical life support systems (as cited in Yavetz, Goldman & Pe’er, 2014).

2.4 The Ambivalent Role Played by Formal Education of Indigenous Knowledge

The role of formal schooling in the communication of indigenous knowledge is contradictory, since education can be viewed both as the reason behind the loss of indigenous knowledge, and as a possible remedy to gain back this loss (UNESCO, 2010). In other words, formal education that has excluded indigenous knowledge from all programs has contributed to undermining its value; however, the world has shifted to a new educational trend, which aims to integrate indigenous knowledge for sustainable development. Studies have pointed out the negative impact of formal schooling systems on the significant background knowledge about nature, culture and values that indigenous children have previously acquired in their communities (Stavenhagen, 2008). Moreover, it is noted that for centuries, education has been utilized as a means of transmission of ideologies of the people in power, thus, indigenous knowledge has been ruined through formal education systems that are conceptualized under western or national norms, which promoted homogenization rather than plurality (Stavenhagen, 2008). According to Stavenhagen (2008), the separation of indigenous children from their families and, consequently, from their cultural roots caused unimaginable damage to indigenous societies and their cultures, in particular. Besides, the stress on Western education systems and institutions worldwide keeps hindering a meaningful inclusion of the indigenous populations and their knowledge and practices within the formal schooling system. Curricula are
among the factors promoting the westernization of education system, which usually lacks:

- contextual relevance and underestimates indigenous knowledge (UNESCO, 2010; Kawagley & Barnhardt, 1998; Barnhardt & Kawagley, 2005);
- teaching methodologies, such as the language of instruction, which is generally the dominant one (Wongbusarakum, 2009 as cited in Barnhardt, 2014);
- assessment strategies (Barnhardt & Kawagley, 2005);
- faculty attitude and the beliefs promoted, which most of the time contradict with traditional teachings (McLean & Nakashima, 2012).

Moreover, the time spent in school does not allow indigenous children to spend more time in community settings to participate in traditional activities (McLean & Nakashima, 2012; Ohmagari & Berkes, 1997). In addition to the loss of indigenous knowledge, indigenous students have shown higher degrees of ignorance, poor attendance and poor academic performance compared to the non-indigenous students (Stavenhagen, 2008). Research on indigenous students’ achievement in formal education systems around the world has shown that the acculturation process promoted by formal schooling widens the achievement gap between indigenous and non-indigenous students at various educational levels; indigenous students are the ones who are neglected and unable to study at higher education institutions. For instance, in Australia, the analysis of the 2009 and the 2012 PISA results show that indigenous students are two and a half years behind the rest of the students in mathematics, science and reading literacy (Dreise & Thomson, 2014; UNICEF, 2007). In the long run, if these findings will not be taken into consideration by policymakers, a negative impact would reflect on aspects, such as educational attainment and poverty in the country (Glewwe & Arteaga, 2014). Efforts to indulge or restore indigenous knowledge and practices through formal schooling have been attempted in many regions of the world; some of which have led to negative outcomes, while others have led to ones that are more successful. According to UNICEF (2007), Latin America and the Caribbean have successfully adopted forms of indigenous education
through adopting intercultural bilingual education models, establishing indigenous higher education institutions, and offering academic programs to increase indigenous populations’ inclusion. The approach to the creation of these institutions and programs have varied forms. In some cases, they have been established by the States; in others, through partnerships among indigenous organizations, higher education institutions, civil societies, private foundations, development and cooperation agencies, or by indigenous movements of the region, which fight for the rights of indigenous peoples to have an appropriate education (Thaman, 2003). The intercultural education approach appreciates the linguistic and cultural differences and promotes dialogue among indigenous and non-indigenous groups. Mato (2008) explains that the innovation of intercultural universities lies in their curricula, which are created with the idea of learning both traditional and non-traditional knowledge. Such curricula not only promote this intercultural notion, but also provide training to the staff who would like to conduct studies on indigenous languages, cultures and world views and to enhance their commitment to the development of their own communities (as cited in Rosado-May, 2013). Intercultural universities have provided training to professionals and technicians in order to secure them with jobs in the health and education sectors, organizations, community projects, small businesses and cooperatives in an attempt to help the communities to improve people’s quality of life through the creation of better services and the protection and enhancement of their rights (Rosado-May, 2013). Intercultural universities have demonstrated a positive impact of education initiatives characterized by dialogue, power balance in the decision-making and mutual respect between the different groups.

The initiative of intercultural universities is considered a formal schooling reform. In other words, it is culturally appropriate education with a school curriculum. It reflects cultural diversity and includes indigenous languages recognizing and contemplating the use of various educational approaches based on different perspectives (Stavenhagen, 2008). Such a curriculum is not only contextually relevant, but also open to the whole national society in general. The above is essential, since they are able to provide precious “insights into ways by which we can extend the scope of our education systems to prepare all students […] to make a fulfilling and sustainable life for themselves” (Barnhardt, 2008, p.114). Hence, it could be noted that educational systems worldwide need reform that would integrate indigenous
knowledge for sustainable futures in order to meet the global challenges, prepare the younger generation for offering solutions to global issues, qualify them to meet the needs of the market, and enhance their critical thinking skills in a way that promotes their countries to sustained growth in all sorts of fields.

2.5 Infusion of Indigenous Knowledge into Higher Education

Because of colonization, IK is sometimes regarded as the knowledge of the poor and illiterate; it was devalued and the colonized were urged to enroll in formal education, abandon their traditional ways, and adopt the Western modern ways that relied on science to explain phenomena. IK is marginalized in the conventional processes of knowledge production. “This form of marginalization produced a generation that for the most, does not understand, recognize, appreciate, value or use IK […] producing people with an intellectually colonized mindset” (Ocholla, 2007, p. 3). For example, the education system in Africa is exported from the West. Therefore, it represents a “cultural violence on African society... Education in Africa has been and mostly remains a journey fueled by an exogenously induced and internalized sense of inadequacy in Africans, and endowed with the mission of devaluation or annihilation of African creativity, agency and value system” (Nyamnjoh, 2004, p. 168). On the other hand, according to Article 14 of the UN Declaration on the Rights of Indigenous Peoples, “Indigenous peoples have the right to establish and control their educational systems and institutions providing education in their own languages, in a manner appropriate to their cultural methods of teaching and learning” (Graham, 2010, p.3). In order to fulfill this right, indigenous peoples must be aided and empowered while taking the initiative to develop quality education systems. Instruction in mother language is recommended for students at all stages through language revitalization programs that should be integrated into the education system. Indigenous researchers have provided a large number of articles about Aboriginal world views and the importance of community learning (Battiste, 2002; Battiste, 2017). Scholars stressed the notion that aboriginal communities must control their education in order to transmit their culture, language, values, and beliefs to another generation (Battiste, 2017; Mashford-Pringle & Nardozi, 2013). Yet, as Kanu (2011) mentions, aboriginal students are now experiencing the dilemma of “the choice between assimilating and dropping out of school” (as cited in Mashford-Pringle &
Nardozi, 2013, p. 21). Thus, it is mandatory for teaching to address the cultural backgrounds of aboriginal students in order to repair the existing situation and create real change in educational attainment. As Kanu (2011) puts it, teachers must recognize “the functioning power of the curriculum in shaping identity, representation, and social and economic circumstances [underlying the call from Aboriginal people to]…have their perspectives integrated not only into school curricula but also the organization and delivery of formal schooling as a whole” (as cited in Mashford-Pringle & Nardozi, 2013, p. 19). Thus, Kaomea (2005) examines the Hawaiian context and documents the teaching of Hawaiian studies. It was demonstrated that non-indigenous teachers lack the knowledge and confidence in teaching this content, besides using outdated resources, which has led to the repetition of colonial discourses about Hawaiian savagery and the random and brutal nature of rules and rulers in Hawaiian society (Kaomea, 2005). In order to fix these deeply rooted misconceptions non-Hawaiian classroom teachers took a back seat to Hawaiian elders and cultural experts, and assumed a supportive role that allowed Hawaiian experts to take the lead. (Kaomea, 2005, p. 40).

Education and in particular quality education in all stages is important for the individual and the community as well. It is considered a tool for empowerment, which transforms society and leads it to development. Higher education universities and institutions promoting indigenous knowledge into education play a crucial role. They should ensure the inclusion of IK in their curricula as much as possible. If we take Africa as an example, South African journals such as *Indilinga* and others have called for innovation in education; despite of all researches and conferences, little attempts have been exerted to come up with innovations. Universities can also collaborate with governments and other organizations to conduct audits of IK and study IK as an attempt to facilitating innovation. Universities, as providers of higher education, have a number of specific objectives (Selvaratnam, 1988):

- to act as reservoirs and transmitters of knowledge;
- to generate and enhance knowledge continuously through research and teaching in the various disciplines;
- to create a pool of qualified people to meet their respective countries’ high-level manpower needs; and
Scholars need to teach IKS and its role in bringing about sustainable development through the integration of IK and Western knowledge in the development process. Universities are responsible for this integration, in their capacity as producers of knowledge. In order to infuse IK into the curriculum, scholars need to intentionally seek to identify to what extent development has been affected by Western nations as well as by local communities – to what extent local communities have had control over this development. They should be concerned to show students the advantages of development that has been transmitted by the local communities and their knowledge systems. Therefore, higher education should facilitate the recognition and validation of the legitimacy of IK as a pedagogic tool. This could be achieved if African universities focus on the African context in the curriculum instead of simulating the West; in such a way, African universities can make a transformative contribution to development. Although many African universities include some topics within their courses that cover IK, there is still a crucial need to not only define IK and its characteristics but also to consider its value and how it can contribute to homegrown development that mingles the best of the two knowledge systems (IK and Western). A suggestion was recently introduced that universities need to provide a common compulsory first-year course that would seek to affirm African views and thought systems which deals with issues such as decolonialization. Nyamnjoh (2004) has argued about the need for African academics to examine the current curriculum in a bid to ensure that the African perspective is reflected. It is also necessary for African academics to continue their research and publication on IK and their role on development and reinforcement of the African identity in academia. Thus, what is required is an innovative concept of the African context to be infused in the subject areas of the universities, teaching, research, and service. And although there are a number of center and universities that offer programs in African studies, these programs are mainly taught by non-African, usually European, professors. That is why many African scholars have argued against this phenomenon because they believe that Africa-related topics should be taught by Africans and from an African point-of-view. The Center for African Studies at the University of the Free State in South Africa is an example since it offers IK and IKS as a specialist field. A number of African countries have attempted to bring IK into center stage. Many universities in
South Africa have begun to appreciate the value of IK demonstrated by the government initiating an audit of IKS databases and awarding a Bachelor of Indigenous Knowledge Systems. This calls for the establishment of institutional, national, and regional science and technology databases, which would contain historical and contemporary IK. There has been a lot of dissertations on the need to move towards localization, indigenous values and mother tongue use in education and preservation of cultural heritage and IK; however, very little is actually taking place (Swanepoe & Van der Westhuizen, 2009). It is also concluded that African universities and research institutions have not made sufficient progress in integrating IK into the curriculum. While higher education in Africa should be playing a major role in the integration of IK or other ways of knowing in their curriculum and teaching, instead, they are ignoring and dismissing such knowledge (Swanepoe & Van der Westhuizen, 2009). Murove and Mukuka (2007) believe that African universities are Eurocentric institutions that promote Western originated knowledge and research, as well as generating knowledge along the dictates of the West in order to be recognized internationally as scholars and to be in line for research funding. Although IK can be taught across disciplines, however, it is not taught within the arts, humanities and social sciences. Moreover, Murove and Mukuka (2007) further explain that in line with global demands, African universities place greater focus on commercial and technical disciplines due to the fact that African governments are more likely to offer university sponsorship to students of sciences, business and technology than the arts, humanities and social sciences. Despite calls for the so-called “Africanization” of education, Nyamnjoh (2012) confirms that universities and other education systems in Africa are still indulged in imitation of the Western education system. According to Altbach, Reisberg, & Rumbley (2009), a number of factors that national higher education systems should take in consideration, which include competitiveness of the sector because of the socio-economic interconnection change, brought about by globalization characterizes the emerging global higher education notion. Private and non-private universities compete nationally as well as internationally for students in order to benefit from the increased demand for higher education. Universities became more responsive to their “customers’ needs” due to the increased demand and competition. Efficiency, effectiveness and issues of quality have become essential requirements in response for the national and international competition among universities. Growth of internationalization has caused an increase in student mobility, and developed the sense of comparison of educational qualifications that facilitate the
mobility of students and scholars (Altbach, et al., 2009). The emerging global higher education concept provides African universities with the opportunity to go on foot with global developments in a way that asserts and values their differences in terms of the curriculum, research and service. In order to cope and merge with the global higher education, universities in Africa have to respond to the challenges presented, in a way that does not destroy their national identity and turn them into victims of globalism. Thus, it is important to mention that the infusion of indigenous knowledge into education in Nubia should integrate global development without abolishing the Nubian identity, language, history, land resources and culture

2.6 Indigenous Knowledge of Nubians

IK of Nubians is a treasure that should never be underestimated. Yet, the history of these people demonstrates the opposite and teaches valuable lessons.

2.6.1 Marginalization of Nubians and loss of their indigenous knowledge after the relocation to New Nubia.

The Nubians are a non-Arab Muslim population who lived in the geographical region known as Nubia in southern Egypt and northern Sudan. One hundred and twenty thousand Nubians were relocated starting from 1964 because the Aswan High Dam Lake swamped their villages. The construction of the Aswan Dam earlier in the twentieth century and the decrease in land availability have led to the immigration of males to such cities as Aswan, Assuite, and Cairo (Gutman, 1994). The Nubians were relocated starting from 1964, because the Aswan High Dam Lake swamped their villages. According to Afify (2012), the largest migration of the Nubians started with the construction of the High Dam in 1963, depriving the Nubians from their natural life around the river Nile and relocating them in the area of Kom Ambo, known as new Nubia. After the relocation of this generation to new Nubia, the Nubian language started to withdraw because of building new schools that teach only Arabic. The younger generation often abandoned their traditional costume for casual clothes being unfamiliar with aspects of their Nubian heritage and preoccupied with fitting in with the rest of the Egyptian society. Other upper Egyptians have also moved to new Nubia, integrating both cultures through coexistence and intermarriage. Older Nubian generations live the nostalgic dream of returning to the banks of the Nile while
younger generations are indulged in fixing the social and economic problems they face in new Nubia, and show no desire in going back to old Nubia. According to a study of the Nubian experience in Egypt (Fahmi, 2014), it is mentioned that the migration of the Nubians after the High Dam construction caused a gender imbalance between male and female inhabitants; according to the 1960 census, it was 59:100 compared to 101:100 for Egypt as a whole. Hence, this migration resulted in the occurrence of a small percentage of males between the age of 15-40 years old compared to the large percentage of females in the middle and older ages Geiser (1987). According to a study (Wallin, 2014), the displacement and resettlement of the Sudanese Nubians into the New Halfa due to the construction of the Aswan High Dam in the early 1960s, resulted in the loss of ancestral land. Besides, a sense of alienation, since the lives of Halfawi Nubians was irreversibly changed due to a continuous struggle to secure themselves both economically and socially. The huge economic and social gap between the compensated resettled Nubians and the host population of nomads and migrant workers led to shattered relations and bitterness among the different ethnic groups. Moreover, the obligatory displacement and resettlement failed to create permanent social development. Relocation of Nubians did not only mean place changing but it also affected their culture. “This has resulted in social change, the direction of which is as yet unidentified and unpredictable” (Fahim, 1983, p. 66). The General Authority for the Cultivation and Development of Reclaimed Land (EACDRL) Reports (2011) recognizes the “traumatic experience” of relocation and the “multidimensional stress” the relocation entails. First, because “the problem of the land use is of major importance not only because it is the principle economic resource of that society, but also because it is deeply linked to its social structure and development” (Basiago, 1998, p. 148). Second, that Nubians feel the social injustice as they believe that they could develop the land if they are granted the right to return to their homeland (Allen, 2014).

Nubians have their distinguished culture and traditions, which may help in boosting the idea of relating education to the environment. The local adaptive solutions Nubians developed to deal with their natural resources and environment e.g. crops cultivation and hot climate could be an asset to the high school curricula. Hence, it is assumed that Nubians would dramatically improve their quality of life if the ESD rooted in the indigenous knowledge is implemented in their high school curricula.
Therefore, maintaining sustainable development through the inclusion of indigenous knowledge into education could act as part of the remedy to the damage that has occurred worldwide as a result of globalization and industrialization.

### 2.7 Cases of Successful Application of Culture-Based Indigenous Knowledge on Education

The following examples are successful attempts of integrating IK in education.

#### 2.7.1 Hawaii.

Hawaii is a unique place in terms of its biological, cultural and physical features. According to the *American Heritage Dictionary* entry “Native Hawaiian” (*The American Heritage Dictionary of the English Language*, n.d.), Native Hawaiians (Hawaiian: kānaka ʻōiwi, kānaka maoli, and Hawaiʻi maoli) are the aboriginal Polynesian settlers of the Hawaiian Islands or their descendants. According to the U.S. Census Bureau report for 2000, 401,000 people are being identified as “Native Hawaiian” (as cited in Kanaʻiaupuni, 2005). Two thirds of Native Hawaiians reside in the state of Hawaii and the rest are scattered among the American Southwest states, especially in California (Kanaʻiaupuni, 2005). The Hawaiian language (or ʻŌlelo Hawaiʻi) was once the primary language of the native Hawaiian people; today, native Hawaiians predominantly speak the English language. A major factor for this change was a 1896 law that required that English “be the only medium and basis of instruction in all public and private schools”. In 1974, *the Native American Programs Act* was amended to include native Hawaiians as eligible for some federal assistance programs, which originally targeted Continental Native Americans. The law prevented the Hawaiian language from being taught as a second language. Nowadays, ʻŌlelo Hawaiʻi is the official language of the State of Hawaii, alongside English. The Hawaiian language has been promoted for revival by a state program of cultural preservation enacted in 1978. Programs included the opening of Hawaiian language immersion schools, and the establishment of a Hawaiian language department at the University of Hawaiʻi at Mānoa. Native Hawaiian culture was revived in 1978 in the Hawaiʻi State Constitutional Convention in which the government committed itself to a progressive study and preservation of native Hawaiian culture, history, and language.
A comprehensive Hawaiian culture curriculum was introduced into the State of Hawai‘i’ public elementary schools teaching: ancient Hawaiian art, lifestyle, geography, hula, and Hawaiian language vocabulary. Intermediate and high schools were instructed to carry out two sets of Hawaiian history curricula on every candidate for graduation. Moreover, the importance of integrating culture-based knowledge in Hawaiian context is highlighted in Shawn Malia Kana‘iaupuni’s article entitled *Ka‘aka–lai Ku–Kanaka: “A Call for Strengths-Based Approaches from a Native Hawaiian Perspective”* (Kana‘iaupuni, 2005). The article stresses that the creation of knowledge is crucial for the self-determination of Native Hawaiians and other indigenous peoples. It also aims to encourage the pursuit of science from a Hawaiian world view. According to the previously mentioned article, empowering Hawaiian communities in the process of analyzing both strengths and needs would enable them to achieve a future of new opportunities that demonstrates how cultural diversity and, specifically Native Hawaiian ways of knowing could strengthen scientific knowledge. According to Deloria, (1997), the prevailing views of native Hawaiians failing to succeed in Western society should be rejected, “it is now time to reverse this perspective and use the values, behaviors, and institutions of tribal or primitive peoples to critique and investigate the industrial societies and their obvious shortcomings” (as cited in Kana‘iaupuni, 2005, p. 220). Thus, researchers support Native Hawaiian culture, using methods that honor and respect its indigenous people. *Ka‘aka–lai Ku–kanaka* is a means to create a pathway to new research and educational paradigms in order to set a compelling vision for the future. Numerous scholars have skillfully highlighted similarities and differences between Western science and indigenous or Traditional knowledge (Snively & Corsiglia, 2001; Barnhardt & Kawagley, 2005; Cagnon & Berteaux, 2009). Thus, it was crucial to incorporate activities that would respond to the Hawaiian context. In 2009 and 2010, the University of Hawaii implemented a course that aimed to infuse traditional knowledge and Western Knowledge into science communication. The course entitled “Communicating Ocean Sciences for Informal Audiences” was introduced at the University of California, Berkely; it was designed to teach university students about pedagogical principles and teaching strategies in both formal and informal education settings such as public aquarium and museums. The course enabled students to better recognize the Hawaiian culture and allowed them to connect closely to their local culture. Moreover, it successfully enabled students to become familiar with Western science education while preserving the values of local people and communities.
Therefore, it could be noted that one of the goals of culturally responsive education is to enable students to preserve their respect for their own cultural knowledge while attaining opportunities to make new connections with other knowledge systems (Lipe, 2014). Another example of successful culture-based education experience is highlighted in the Nā lau lama community report. The practice of tēnā, the focus of the Nā Lau Lama Culture-Based Education (CBE) Working Group begins with the needs of the haumāna, or student. Culture-based education employs a variety of tools and educational strategies, which focus on developing each student’s own innate talents and skills. Haumāna are the foundation and the first component of the culture-based education triangle, which has developed as a model to explain the fundamental components of Hawaiian culture-based education and their interrelationships. Members of the CBE Working Group voluntarily participated in the first Nā Lau Lama conference in January 2006. Subsequently, the group members assembled at the Native Hawaiian Education Association Conference in March 2006 to start working on the Nā Lau Lama project. Most of the group members had first-hand experience in teaching and developing curricula hence they had shown deep passion and appreciation for education that is relevant to the host Hawaiian culture, they integrated different teaching strategies that emphasized Hawaiian values and ways of knowing. For example, the setting and environment of a culturally responsive classroom, whether indoor or outdoor, is meant to reflect cultural ways of doing things. The volunteer educators were fully committed to providing their haumāna with the most effective educational strategies since they believe that culture-based education is not a mere supplemental strategy or a variety of “curricular approaches.” (Kukahiko, 2014). The strategy of the project focused on identifying content, methods, and educational models rooted in Hawaiian culture that can be implemented throughout the Hawaiian state’s public education system. The report also stressed that culture-based education needed to be fully integrated in the mainstream educational realm for all children, faculty, staff, and administration. Culture-based curriculum connects Hawaiian kids to Hawaiian ways of learning and doing by connecting host Hawaiian culture to mainstream academics in order to produce meaningful content which is relevant to all teachers and students. This could be possibly applied to teaching of science, math, reading, social studies, and language arts in the context of Hawaiian culture by using the resources of the communities and places in which haumāna live and teachers teach, including using traditional Hawaiian learning sites like lo‘i kalo (taro patches),
loko i’a (fishpond), and wa’a (canoe voyaging). In the early 1800s, Western cultural and educational practices that were brought to Hawai‘i resulted in suppressing Hawaiian cultural knowledge both in content and context. That alienated generations of Hawaiians, creating a growing disconnect between learning and the relevant application of knowledge in contemporary times. Thus, the education system then had failed to successfully establish a practical, innovative, spiritual, and necessary connection to Hawaiian students’ unique and vibrant culture. In the *Haumāna Ma Ka Hana Ka ‘Ike* “The knowledge is in the doing”, haumāna, the students, are the first component of the culture-based education triangle (Kukahiko, 2014). It was witnessed that practical experience has proved that students learn best by doing; students effectively learn when they are involved in something interesting. Moreover, they remember what they have learned longer after the experience, and develop better understanding of the subject matter. Thus, it is obvious that a quality student-driven learning process in culturally appropriate learning environment is essential for students in the 21st century. Context is the second important component in culture-based education, since it makes learning useful, applicable, and relevant. Context of learning is called the ‘honua’ and is defined as family, school, community, ahupua’a, island, and special culturally significant places, such as wahi pana (celebrated places) and pu‘uhonua (places of refuge) (Kukahiko, 2014). As Lipe (2014) explains, context includes the internal and external components that contribute to learning; in other words, the intra- and intergenerational relationships that are key in defining one’s place and identity in one’s own culture. The context of teaching is in a state of constant evolution and dynamic changes. In Hawai‘i island, the unique local culture and socioeconomic state has evolved at different rates and each has been characterized by unique multicultural mix. Hawai‘i is a distinguished place with its own remarkable host culture, resources, and rich cross-cultural mix of people, therefore public schooling should grasp all the learning opportunities available in each community to educate and empower children to learn, share, and explore different experiences. In modern Hawaii, the Hawaiian culture helps people to connect to other people, places, and ideas which are the corner stone upon which the contemporary Hawaiian culture is nurtured and sustained. Content is the third major component of the culture-based education model. Content is the knowledge that includes cultural and academic, besides the language and values of the culture as they are resembled in everyday life. Cultural content includes the protocols and practices that are necessary to understand how each haumāna relates to their honua (family, community, and world), the context
of their learning. Moreover, culture-based education requires the full infusion of an essential fourth component, which is spirituality. The ways in which haumāna, along with a’o/content and honua/context, are contained by the spiritual, are common factors that are reflected in all indigenous knowledge. Each indigenous culture contributes its own unique “lau” based on the common life experiences of its own people. The representation of the haumāna at the base of the triangle symbolically denotes that they are the target and foundation for all educational efforts. As students mature and grow, they are urged to pursue the following Hawaiian culture based guidelines for learning: ‘Nānā ka maka’ which means to see with your eyes, Ho’olohe ka pepeiao which means to listen with your ears, Pa’a ka waha which means Don’t speak too quickly, and Hana ka lima, which means to work with your hands. The kalo leaf/triangle also explains that “a’ohe pau ka ‘ike i ka hālau hoʻokahi,” or “all knowledge is not learned in one school”. This concept embodies respect and recognition of different experiences, backgrounds, and abilities of each of us and urges humans to celebrate their successes, accomplishments, and ability to innovate. In the 21st century, the integration of Hawaiian cultural content and culture based education context into current Hawai’i Content and Performance Standards (HCPS) has been appropriately demonstrated and future education is expected to witness intense implementation of such curriculum in Hawaiian culture-based learning communities and public education.

The experiences of successful models of education that would employ the assets of indigenous knowledge can enrich the learning experience of all students. It enhances their critical thinking skills by allowing them to see the world from different perspectives. Braiding indigenous knowledge with school curricula can promote a sustainable society where different values and traditions are acknowledged and appreciated (Visagie, 2016).

2.7.2 Brazil.

Brazil is considered another case of successful application of indigenous knowledge on indigenous peoples of The Brazilian Amazon. ‘An Authorship Experience’ of the Pro-Indigenous Commission of Acre (CPI/AC) is one of the oldest non-governmental organizations in Brazil started in 1983 aiming at supporting the indigenous societies in the Amazon region in their quest for cultural, social, economic
and environmental sustainability through the training of individuals as representatives in the areas of education, health and environment (Maher, 2014). This organization has created a program, which mainly aims to train teachers and agro forest agents, and their communities as a whole to identify the socio-environmental problems of their territories within a national and international context, think and act positively to find solutions, by means of formal and informal environmental and intercultural bilingual education. This comes in accordance with the Lei de Diretrizes e Bases (LDB – Basis and Guidelines Act) for Brazilian Education which affirms the right of indigenous peoples to exchange and share intercultural bilingual education. According to Article 87 of the LDB, formal and complete training of all indigenous and non-indigenous teachers is mandatory by the Federal State (Union), of the states and municipalities (as cited in Lopes da Silva, 2000). This new national legislation allows indigenous schools the right to study in their own languages, the right to create their curricula, as well as the right to decide on their own process of learning. According to Lopes da Silva (2000), 10,000 persons from the total indigenous population are meant to benefit from this program. Indigenous teachers in partnership with their tutors from the Pro-Indigenous Commission of Acre and advisers of several universities of the country have successfully produced eighty textbooks and a new curriculum. Later, students who have participated in the program of the indigenous forest schools have been trained to become agro forest agents who are selected and nominated by their communities to spread awareness of local environmental problems, and teach other indigenous people how to think and find solutions to these problems within both local and global perspectives which acts. Among the indigenous nations participating in the program, two monolingual in Portuguese, with very few elder individuals who can speak their indigenous language for educational purposes but not for daily social function, three bilingual nations with dominance in Portuguese, and seven indigenous bilingual nations with dominance in indigenous languages. On one hand, more than half of the indigenous population of Acre (approx. 5,876 people) continues to actively practice their language and culture in their daily life while the younger generations, especially in territories near the villages, young adults and children do not speak their indigenous language, but can understand it. The indigenous educational representatives use the ‘Centre for the Training of Forest People’ as a demonstration area and pedagogical model for teachers and agro forest agents. The focus of the program is on the active learning of indigenous oral and written languages in the
educational process, via both creative and academic tasks that are shared among the indigenous students of different nations and mother tongues. Moreover, it aims at the production of textbooks, sculptures, paintings, videos, music presentations, etc., as part of the school curriculum; some of this material is also used at non-indigenous schools, approved by the Ministry of Education as part of the material for teaching the Intercultural Issue to all Brazilian citizens (Lopes da Silva, 2000). Another objective of the program is to strengthen ethnic traditional knowledge by teachers, students, and agro forest agents through research in several subjects such as cosmology or science. Besides, providing access to universal contemporary knowledge, values and technologies – such as health practices, agricultural tools, or the recording of music and history on tape or video – are considered important to students’ daily lives and their relation with other languages, cultures and societies (Guilherme, 2015). The place-based education envisages that students would become agents of their own educational development, as well as educational development of their communities, that would be naturally embedded in their daily professional lives and practice. For example, during the process of the professional training, the agro forest agents also become members of the public staff, receiving compensation for their work at the schools and communities from the State Secretariat for Education and Culture, in order to be socially controlled by the communities and parents. The community members play an important part in decision-making regarding the choice of traditional ethnic subjects in the curriculum and the elaboration of textbooks. The work is developed by joint efforts of two local indigenous organizations and political entities: the Organization of Indigenous Teachers of Acre (OPIAC) and the Association of the Movement of the Agro forest-Agents (AMAIAC). Both organizations aim at enhancing and creating indigenous education, which works for the protection of the land, economy, and environmental and cultural sustainability in accordance with the needs of each ethnic group (Guilherme, 2015).

Thus, the concept and methods of the program focus on the individual and collective ‘authorship of indigenous people ‘and on the different aspects of educational, linguistic, environmental and cultural decisions, as important elements of the self-determination of indigenous nations. Indigenous languages and Portuguese, and other non-verbal traditional means of communication and expression – such as graphic arts, sculpture, music and performance – are used in the intercultural
education process to refresh, convey and intensify the value of the teacher/students’ own culture in the necessary dialogue with other cultures and languages (Lopes da Silva, 2000). As Tucker (2016) stresses, the training courses offered to teacher/students and agro forest agents allow for thinking and communication among the participants of diverse indigenous cultures and their non-indigenous tutors and advisers. This knowledge is interpreted through new forms of articulation and expression (verbal, graphical, audio-visual) and through indigenous languages as well as Portuguese (Sjorberg & McDermott, 2016). Autonomous reflexive work by the teachers and agro forest agents enables them to plan and evaluate their performance at school and in the communities. This includes different research activities on locally specific subjects and intercultural universal themes, which together form the material for producing textbooks, videos and other educational material. Besides, expressing oneself using indigenous languages as a form of expression is being encouraged by all tutors and agro forest agents for teachers and students. Most of the teachers acknowledge the importance of using their language in their school curriculum and training situations. The diversity and the heterogeneity of the sociolinguistic situations are part of the nature of the school’s social realities and their representation in the curriculum, which creates more than one model for the use of language. Bilingual indigenous communities exert great efforts to record their identities, histories, music, religion and art through research. The curriculum is regarded as a historical collective process, which involves indigenous leaders, teachers, agro forest agents, their advisers and tutors, and the institutions to which they belong. It has to respond to the current and expected daily social and environmental problems, which affect their natural, linguistic and cultural resources. The curriculum stresses and expresses their opinion of the biological, social and linguistic diversity of their local world in relation to global problems in general which revives their knowledge concerning the management of the forest and other natural resources while benefiting from the experience of the elders. Thus, the process of work and the curriculum for the training courses consists of three main themes: language, culture, and land/environment. General subjects include the issue of colonization, the loss of indigenous lands, and indigenous peoples’ struggle for their rights; universal themes include issues such as health, environment or human rights. Curricula contents and subjects are written in indigenous languages and in Portuguese in different forms of documentation, such as short stories with drawings, performances, sculptures or videos. Moreover, they give
special attention to contemporary themes such as AIDS and the threat to water resources, which has produced new generations of textbooks that include transversal themes acknowledged in the Curricular Reference for Indigenous Schools and the study areas of curricular programs in indigenous schools (Abbonizio & Ghanem, 2016). Vacation times are determined according to families’ and communities’ agricultural activities such as planting and harvesting in order to enable students to participate in these activities and learn from family and friends about their culture. Most non-indigenous tutors and advisers of the program are Brazilian teachers who come once or twice a year from various Brazilian universities to participate in the intensive training courses in the city of Rio Branco (Maher, 2017). They are also responsible for editing and organizing the textbooks based on the texts and drawings produced by the in-service training teachers in the course. The indigenous teacher and agro forest students are young adult and adult men and women who were chosen by their communities to be trained as teachers and agro forest agents and who started their educational career teaching the literacy courses provided (since 1983) by the Pro-Indigenous Commission Education Program. However, the role of women in their traditional culture is limited to only 10 per cent of the teacher-students are women due to cultural concerns while the rest of the agro forest students are males who study for two months in the state capital and are evaluated from other visiting teachers and advisers; they give classes in their villages to the first grades of primary level, as outlined in the section on ‘methods used’ (Bergamaschi & Medeiros, 2010). Forty seven of these teacher-students have participated in around 6,000 hours of training courses and the other modalities of learning situations and have received their official certificate as bilingual and intercultural teachers. They are now able to enroll in the two universities in Brazil that have recently started to prepare indigenous teachers for bilingual and intercultural education. Three of the indigenous teachers of Acre are already enrolled in superior training in a Brazilian university in another state of Brazil and will be able to teach the second part of the primary level and the secondary level to their students. Indigenous teachers, students, advisers and other members of the different communities have developed around eighty indigenous textbooks as educational materials during these training. The books, written in Portuguese and indigenous languages, cover various areas of interest in cultural and intercultural relevant subjects and have become a fundamental part of the pedagogical methods and the curricula of indigenous-teacher-training programs. The material used has
responded to the need of creating and increasing the concept of a new kind of written literature transmitted in indigenous languages and Portuguese, as well as diverging into new forms of cultural media, such as video, CD-ROM etc. It has also been used as a means to perform research on both new and ancient knowledge, its documentation and diffusion. Collective means of production during the stages of training referred to as ‘attendant’ and ‘non-attendant’. This designed material is sometimes developed by indigenous teachers of different ethnic groups and mother tongues: hence, the texts are usually in the main language-the Portuguese. These texts may include descriptions of special activities experienced during the courses or taking place in the participants’ daily lives with their families and friends throughout the year (Bergamaschi & Medeiros, 2010). Hence, the Hawaiian and Brazilian case narratives could imply some ideas on bridging the gap between Nubians as an indigenous community and the Egyptian community. As a result, indigenous students are expected to show improvement in academic achievement and more regular attendance. It could be noted that adopting the Hawaiian and Brazilian cases in which place based learning and hands on experience are integrated into curriculum could be a model to follow and apply on indigenous communities and marginalized groups as in the case of Nubian people.

2.7.3 Australia.

The achievement of educational equality for Australia’s indigenous peoples has been an urgent national priority since the year 2000, a model was designed by The State, Territory and Commonwealth Ministers of Education (Barr et.al., 2008). The Council agreed to cooperate with schools in order to achieve the objective of addressing areas of common concern and of more culturally inclusive and educationally effective schools through using the above-mentioned model as a framework for action. The model was to be used by schools as a means of creating sustainable change and development that involve the successful outcomes of indigenous knowledge into school curriculum based on a number of findings from recent work (Barr et al., 2008). The three focus areas of the model were: community, school and classroom. Each area has various aspects that need to be addressed: (1) community: partnership arrangements (including teachers and parents), decision-making, planning, accountability; (2) school: leadership and coordination,
environment, organization, professional development, curriculum, monitoring, assessment and reporting; (3) classroom: teaching strategies, learning styles, classroom organization, standards and targets, intervention/additional assistance. As estimated by the policy makers the school community should have a common understanding in respects of the importance of adopting advanced approaches to the teaching and learning of indigenous students. Grace and Platow (2017) emphasize that the school community must be proactive on behalf of students and systematically link with their parents at home and the wider community as well. The school community should acknowledge the close relationship between low levels of Indigenous educational outcomes and issues such as poverty, health, housing and access to government services and infrastructure and finding effective solutions to address these issues. Besides, a strong partnership between the school and community should be embedded to closely support Indigenous parents and caregivers to collaborate in order to improve the standards of education and to be actively involved in the decision-making processes and planning for the introduction of new programs. Active agents from the community monitored and reported these changes once a week to the community. As a result of this follow-up process, indigenous students are expected to show improvements in academic achievement and more regular attendance. In addition, one of the fundamental requirements of the leadership team of the school was that it helped everyone in both the school and community, addressed their needs and responded to their inquiries. Environment settings were meant to be included since they are the most powerful factors that support good quality learning and sustainable development for indigenous students. A safe and supportive school/community environment, which reflected care and respect for the needs of students contributes to sustainable change, was also an important factor in the model. The effective infusion of successful approaches to the teaching and learning of Indigenous students was based on trust and the involvement of key stakeholders in establishing, implementing and monitoring common and agreed codes of conduct and operating standards including time, staff and resources. In addition, flexibility was important as a form of readiness of educators to exert all the needed effort in order to improve students’ achievement and accommodate to changing circumstances and arising challenges. As for professional development, opportunities were provided for educators to attend off-site and on-site professional development in order to integrate new teaching approaches. The team leader was responsible for monitoring the
implementation of the proposed changes; meanwhile, the team members were held responsible for each other’s growth in the introduction of a new approach. A common framework of standards was a pre-requisite for improving Indigenous student learning outcomes through setting explicit and specific targets for the school and the students. To assess that the approach was successful, it was crucial to examine whether the learning of Indigenous students had contributed to the achievement of education-sustained development according to the standards described in *The Statement of Principles and Standards for More Culturally Inclusive Schooling in the 21st Century* (McKeown & Hopkins, 2016). Thus, a successful approach to the teaching and learning of indigenous students was to be integrated through the implementation of a dynamic and responsive curriculum that contributes to the development of essential knowledge, skills and attitudes in critical situations. Performance measurement was conducted according to a standards framework, especially the national literacy and numeracy benchmarks and goals. The continuous monitoring and assessment of indigenous students provide information on how to direct education in future. The case study results indicate the classroom teaching strategies, learning styles, and all ongoing and new school/community programs should provide multiple creative opportunities for indigenous students to learn, achieve and reflect on their own learning. They should also provide a supportive environment based on respect for diversity as it is crucial for educators to effectively integrate new approaches into the mainstream of the school curriculum and to be able to work collaboratively with their Indigenous students and to find suitable teaching practices that respond to the needs and strengths of the Indigenous learner. Including one-on-one and small group teaching, individualized learning programs, mentoring programs and parent/community support were some of the objectives of their study. In regards to the classroom organization as they believe, it should identify different learning styles, needs, and performance levels, areas of interest and general capacities. Thus, the Australian model, which addressed indigenous students, proved to be efficient and successful in achieving the goals of education for sustainable development.

From the discussion presented here, one can compare the context of Egypt with that of the three discussed countries. There are a number of similarities between Nubians as an indigenous nation within Egypt and the indigenous communities in Hawaii, Brazil, and Australia. These include uniqueness of place and cultural aspects,
low levels of indigenous educational outcomes, and the spread of social problems such as poverty, diseases and housing. Such a comparison can be a point of departure to investigate the possibility of applying these models to the infusion of indigenous knowledge into higher education. Indigenous knowledge can be the answer to many of the problems that countries such as Egypt suffer from. With a type of knowledge that is deeply rooted in the local surroundings and community, indigenous people can respond to many challenges that hinder development. The coming section discusses in detail the implications of indigenous knowledge on the efforts exerted to achieve sustainable development.

2.8 Sustainable Development

Initially, the term “Sustainable” means capable of being sustained in future; sustainable development is only possible if society is involved in the development process, which must be rooted in the culture of the country. The term “Sustainability” refers to development that satisfies the needs of the present without compromising the capacity of future generations, guaranteeing the balance between economic growth, care for the environment and social well-being. Sustainable development is based on the three corner stones of sustainability: economic, environmental and social sustainability. It is only maintained when there is balance between these three aspects. Carter (2007), defines sustainability science as a transdisciplinary science that studies the complex nature-society interactions to meet fundamental needs and conserve the earth’s life support systems (as cited in Disterheft, Caeiro, Azeiteiro, & Filho, 2013). Cultural, linguistic diversity and indigenous knowledge are crucially important for preserving biodiversity and ecological sustainability (Disterheft, Caeiro, Azeiteiro, & Filho, 2013). In particular, in African developing countries, the sustainability of cultural diversity is at risk; accordingly, researchers and organizations have acknowledged the dominant role of globalization with regards its contribution to the sustainability problems worldwide (e.g., International Council for Science, 2002: UNESCO, 2009: United Nations Commission of Sustainable Development, 2002: United Nations General Assembly, 1992). UNESCO (2010) in response to this urgent concern, has pointed out that sustainability includes also learning to live in respectful relationship with the environment and each other.
2.8.1 Sustainable development goals (SDGs).

SDGs were launched after Paris Conference in 2015. Among the 17 goals adopted, goal 4 “Quality Education is considered the most important goal as it contributes to all the other goals. It guarantees “inclusive and equitable quality education and promotes lifelong learning opportunities for all” (Wulff, 2017, 1). This acknowledges the crucial role of education for sustainability to promote and maintain development in general, and for each individual, in particular, aiming at achieving a” learning society” in which people are able to learn from one another and deal with problems and complexities.

2.8.2 Definition of the quality education and its impact on sustainable development.

The concept of quality education is not easily defined; several educationalists, researchers and policy makers have attempted to provide definitions. The American Society for Quality Control (1987) defines it as “the totality of features and characteristics of a product or service that bears on its ability to satisfy stated or implied needs” (p.2). Rajput and Walia (1997) defines quality education as “the efficiency in meeting the set goals, relevance to human and environmental needs and conditions in relation to the pursuit of excellence and human betterment”(as cited in Barret et al., 2006). UNESCO and other organizations describe it as “necessities at a minimum that learners develop foundational literacy and numeracy skills as building blocks for further learning, as well as higher-order skills” (as cited in Barret et al., 2006). The latter definition falls in accordance with SDGs as it calls for the foundation learning on both numerical and non-numerical levels which can develop further learning that incorporates higher cognitive skills and links the various stages of learning in terms of skills and knowledge. The concept of lifelong learning broadens the role of education in creating a diverse workforce environment. Buckler and Creech (2014) provided a smart collective description of quality education which states that quality education for sustainable development promotes people’s sense of responsibility and self-image as global citizens preparing them for the world they will inherit (as cited in Adams, Martin, & Boom, 2015). Hence, quality education is considered an effective tool that provides opportunities for economic growth and can have a significant role in the cycle of development. An education system that is developed without the participation of
indigenous people and without incorporating their culture cannot lead to improvement in students’ academic performance and commitment.

2.9. Education for Sustainable Development

2.9.1 Definition of education for sustainable development.

In 2005, Education for Sustainable Development (ESD) was a challenging concept, which called national governments, educational organizations from kindergarten to universities, NGO’s, business and media to value “learning” as a key factor for change toward a sustainable future. ESD is an inter-disciplinary pedagogical approach to learning, which covers the integrated social, economic, and environmental aspects of the formal and informal curriculum, as well as to training staff to assist graduates who wish to promote the skills, knowledge and experience. This helps to contribute to an environmentally and ethically responsible society, and pursue a career that adopts those values (Mckeown & Hopkins, 2016). The concept of sustainable development has emerged from the, United Nations Conference on the Human Environment (1972) where the international community officially recognized the interrelated nature of human activities and the environment. Sustainable development is mainly concerned with attempts to achieve a balance between the economy, society and the environment. The principle of sustainable development has gained considerable appeal since The United Nations World Commission on Environment and Development (Our Common Future) Report of 1987 and The United Nations Conference on Environment and Development of 1992 (known as the Rio Earth Summit) gave rise to the most recognized definition of Sustainable development. They referred to it by “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (as cited in McKeon & Hopkins, 2016). This demonstrates the importance of education for the purpose of sustainability. According to UNESCO (2010), ESD requires participatory teaching and learning methods that urge and stimulate learners to change their behavior and take action for sustainable development concerning local and global issues. Hence, education for Sustainable Development develops skills and competencies, such thinking, imagining future scenarios and making decisions in a collaborative way to ensure sustainability.
2.9.2 Opportunities of ESD in higher education.

Higher education (HE) plays a crucial role in attaining the 2030 Agenda for Sustainable Development (SD) and the 17 Sustainable Development Goals (SGDs), which aim to end poverty, protect the planet, foster gender equality, defend and promote cultures and cultural understanding, and ensure prosperity for all. HE attempts and adopts innovative approaches to resolve current and old global, regional and local issues through disciplinary and trans-disciplinary teaching and research cooperation and national and international teaching. Sterling (2017), explains that higher education is not only preparing for a stable future, but also nurturing individual and collective potential towards human and planetary evolvement. UNESCO (2010) stresses that Education for Sustainable Development is meant to provide students at all stages with the opportunity to acquire the knowledge, skills, attitudes and values necessary to shape a sustainable future. The International Association of Universities (IAU) is an international non-governmental organization and an official partner of UNESCO, which brings together around 650 higher education institutions (HEIs) and organizations in 130 countries; it acknowledges the importance of the role that higher education (HE) plays in order to achieve sustainable development. IAU adopts Brundtland’s definition of sustainable development, which states that “Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (cited in Keeble, 1988, p.34). IAU embraces the vision that future well-being of humanity and the planet depends on successful resolution of the interconnected challenges of economic, social, cultural, and environmental sustainability. The Association above has participated for over three decades in both international and regional activities and events which aims at enhancing the infusion of sustainable development (SD) into higher education, policies, strategies and work. It also launched its first Global Survey on the Role of Higher Education in Fostering Sustainable Development in 2016. According to the IAU HESD Portal (2016), the conducted survey was an attempt to contribute to the Global Action Programme on Education for Sustainable Development (GAP) by researching and analyzing the different approaches of IAU Members towards sustainable development. The results of almost 72% of the respondents from all continents showed their interest in targeting Sustainable
Development Goals (SDGs) and integrating Education for Sustainable Development (ESD) at all levels in universities.

According to *IAU HESD Portal*, IAU’s Strategic Plan 2016-2020 comes in accordance with the 2030 Agenda for Sustainable Development and provides a framework for university leaders to promote inter institutional collaboration in an attempt to achieve sustainable development, and help HEIs leaders to embrace sustainable development concepts and principles in strategic planning, academic and organizational work (United Nations, 2015). The aim of the Strategy is “To encourage UNECE member States to develop and incorporate ESD into their formal education systems, in all relevant subjects, and in non-formal and informal education.” (United Nations. 2015, p. 40). The evidence for the growing global trend towards the integration of sustainable development into education is the number of European countries, which have set up national networks and programs for Sustainable Higher Education. This number continues to grow and some universities have included ESD in their strategic plans; other universities have included the social and economic dimensions of sustainable development and have replaced or are replacing their environmental policy with a policy for sustainable development. Some universities have introduced and integrated SD to new students ranging from two hours to 15 credit hours mainly to engineering study programs through lectures, seminars, assignments and papers. Trained students have the opportunity to make projects, surveys and lesson plans about SD in their local schools. The objective of ESD integration into faculty courses is to increase awareness among faculty and staff of universities of the wider SD concept and the different perspectives of sustainability in relevance to their disciplinary faculty courses.

Finally, the experiences above reveal that much effort is still needed. The results above also denote an increasing collaboration of universities regarding sustainable development issues, and attempts of engaging with sustainable development networks, in order to follow examples on how higher education institutions integrate the different SDGs into the curriculum. Among the recent approaches in teaching and learning which can contribute to sustainable development are place-based learning and hands-on experience. The following sections discuss these two notions in relation to sustainability.
2.10 ESD Pedagogies

2.10.1 Place based learning.

According to Oxford Research Encyclopedia of Education (Lingard, Sellar, Lewis & Noblit, 2017), place-based education is defined as “an approach to curriculum development and instruction that directs students’ attention to local culture, phenomena, and issues as the basis for at least some of the learning they encounter in school. It is also referred to as place- and community-based education or place-conscious learning” (n.p.). By adopting the approach of place-based learning, teachers prepare students academically, since teachers tie learning to environment and community development, which are the two basic concerns of Education for Sustainability.

Place-based learning aims to instill in learners the desire and ability to become involved citizens committed to the betterment and welfare of both the human and communities of which they are a part. The core of place-based education is the belief that children of any age are capable of attaining remarkable achievements to the lives of others in a sincere desire to learn and believe in their own potential of being change agents. When place-based education is effectively implemented, both students and communities benefit, and their teachers often encounter a renewed sense of professional and civic satisfaction.

Place-based learning is a pedagogical approach that employs places and their cultural, historic and environmental resources as a base for learning within school and university programs and courses. Place-based learning connects students to community, ignites curiosity engagement and achievement. Teaching towards sustainability relies so much on place-based learning and project based approaches to pedagogy; it is also an effective tool to conceptualize community and respond to the global challenges and changes that exist at present and may arise in future. In addition, place-based learning improves students’ engagement and helps them to think of solutions and alternatives since it promotes their creativity as a result of experimenting processes. According to Smith (2004), place-based education means learning to be where you are; the main importance of place-based learning lies in the fact that it strengthens student’s relations with the lands on which they live and helps them
overcome the sense of isolation and aloofness, which benefits the individuals as well as the communities. Smith (2002) explains that educators in place-based learning seek new models of teaching through an effective use of the resources.

Place-based learning has far-reaching benefits, which include:

- Enhancing students’ academic achievement and abolishing their sense of isolation from their lands;
- Improving the environmental, social and economic vitality;
- Creating an energetic relation between schools, students and communities;
- Increasing the awareness of citizens regarding understanding and appreciating their communities; and
- Acquiring knowledge and skills, which would help students to participate in the democratic process.

It is the common understanding that if knowledge were not connected to real world experience, students would not have the chance to implement their knowledge in real life and would neither appreciate their communities, nor value their histories and cultures. Moreover, schools would become isolated and deprived of public service and contribution. In order for place-based learning to be successful, it should be built on the following constructive principles:

- Ensuring that learning takes place on-site in the local community;
- Providing learning, which is relevant to the learners;
- Asserting that learning contributes to solving global issues and improving the vitality of their communities;
- Empowering engagement of local organizations, agencies, governments and individuals in the community’s role to achieve sustainable development (Smith, 2002).

Thus, place-based learning is an umbrella term for a variety of educational practices and purposes, including experiential learning, contextual learning, problem-solving learning, constructivism, outdoor education, indigenous education, environmental and ecological education, bioregional education, democratic education, multicultural education, and service learning (Smith, 2002). International and local
research stresses that implementing place-based education in different contexts has a positive impact.

### 2.10.2 Hands-on experience.

One of the inspiring experiences of place-based learning is SEKEM-Egypt Experience. SEKEM foundation in Egypt was established in 1977 with the concept of sustainable development and giving back to the community. SEKEM’s vision is to maintain sustainable development towards the future, where all individuals can reveal their hidden potential, live with others in relations of respect and conduct activities in agreement with ecological and ethical principles. In 2017, SEKEM community developed its Vision, Mission and Goals for the coming 40 years to transform Egypt’s ecology, economy, society and cultural life (Hatem, 2007). In order to fulfill its commitment to serve the community and realize the sustainable future for Egypt, SEKEM implemented the following strategy. According to SEKEM Sustainability Report (2017), the company has suggested biodynamic agriculture as the competitive solution for the environmental, social and food security challenges of the 21st century, and supported individual development through holistic education and medical care. Besides, it emphasized human dignity and support to employee’s development through creating work places. Its business model was successful as it combined the ecological and ethical principles, and was in line with the research in natural and social sciences for sustainable development. What makes SEKEM a valuable example, is that it advocated local and global approaches for achieving sustainable development and focused on education. SEKEM viewed education as a continuous challenge and the cornerstone of holistic human development and advancement. Their vision was that learning throughout life would contribute to the development of the individual, the community and the country.

SEKEM’s Vision, Mission, and Goals were realized in practice. The SEKEM School was founded in 1989 with 300 pupils enrolled in all learning stages. It is situated near Bilbeis, about 60 km., North East of Cairo, on the premises of SEKEM. Students come from all social levels and mainly from the nearby town of Bilbeis or the surrounding rural neighborhoods. The school embraces both Moslem and Christian children alike, encouraging them to live in harmony and respect for the
diversity of religious practices. SEKEM School is accredited by the Egyptian Ministry of Education and follows the Egyptian State Curriculum; however, it also promotes new forms of educational and social interaction that focuses on improving students’ knowledge and skills and programs which enhances the integrity and identity of each individual. Hence, traditional education is complemented with courses in crafts, drama, dance and music. Integrating traditional educational methods with creative learning experiences fosters the maximum social, cultural and educational development of each child. SEKEM School provides spacious and well-equipped campus that includes workshops and a theatre, which enables a suitable working and learning environment for all age levels. SEKEM schools welcome students from rural, semi-urban and urban areas from all social levels workers and native Egyptians and foreigners alike. Students are also diversified with respect to their educational needs, ranging from regular public schooling, and technical education to vocational training.

In addition to the general school system, SEKEM offers a three-year vocational and technical Educational program which was established in 1997. Since 1999, the VTC has been accredited by the Initiative for Industrial Schools for Vocational Training (formerly the Mubarak-Kohl-Initiative), a highly successful German technical assistance project in Egypt. The aim of this technical education program is to provide young people with useful professional skills that respond to the demand of the local labor market. The program stresses “learning by doing and doing while learning”, as well as on the job training, practices, and preparation. In accordance with the SEKEM philosophy “learning by doing and doing by learning”, on-the-job, training is emphasized and practical skills are employed (Hatem, 2007, p.2). Trainees in the vocational training center participate and are instructed by both local and foreign-trained staff. The SEKEM Kindergarten was founded on a large green landscape open to all children of employees from surrounding villages and provides a strong foundation for children to develop and become active participants in life-long learning processes. A program is designed for children from four to six years, with special pedagogical emphasis on creative play and discovery to ensure the individual and social development of each young child. The sensory experiences that children undergo in this program play a major role in their development; it enhances their sense of creativity and excitement through hands on experience to discover
nature and the surroundings. The program includes practical and artistic work, imaginative play, fairy tales, puppetry, music, circle games and healthy outdoor activities. Great emphasis is put on the development of all senses, in particular on the children’s imagination and creativity. Moreover, The SEKEM Environmental Science Center (SESC) offers interactive science classes that cover environmental topics for students from the SEKEM Community and from local and international schools. The program also contains one-day field trips, which include practical activities that cover a wide variety of school subjects including chemistry, biology, physics and geography.

Sekem Environmental Science Center (Bond, Maram, Soliman, & Khat tab, 2012) has other beneficial aspects such as strengthening the concept of learning outside the classroom, teaching environmental sciences and its principles, using inquiry-based and hands-on educational methods, increasing environmental awareness, enabling students to participate in society, and fostering creative thinking among students. During the first weeks of work, a teacher escorts the students in their new environment. The amount of work gradually increases in order to enable students to gain confidence and learn skills and experiences, combined with the continual educational process, later after graduation students receive a certificate of qualification SEKEM generally believes that everyone has individual skills and everyone deserves a chance. This results in the policy of inclusion of the disabled individuals, all genders, all ages, diversified religious beliefs, all social levels and all nationalities. More than 30 disabled persons are integrated into the workplaces of the group of SEKEM and have participated in a special education project that takes six years. According to their capabilities and the state of health, the graduate later begins a three-year qualification phase in a safe environment on the campus, such as the cattle farm, the nursery, the paint or sanding workshop. SEKEM and its companies comply with hiring procedures that ensure equal opportunities during the recruiting process. SEKEM also strengthens the women’s position in the outer community through microcredit and education programs that improves their household income. It offers the opportunity for female employees to continue their work at home, especially during production peaks. This allows married women who are usually married early according to rural traditions to contribute to the family income and keep their independence. Moreover, SEKEM offers childcare for women who continue the work at the SEKEM main premises. For SEKEM’s efforts in supporting women, World
Bank and UN Women granted SEKEM the “One Business Community, Equal Opportunity Seal” (Bond, Maram, Soliman, & Khattab, 2012).

Therefore, it is obvious that education for sustainable development in Egypt can gain attention and be engaged in implementing and integrating new approaches of hands-on experience. Such education can complement the traditional learning programs in a balanced way providing all students and community individuals with equal chances of work and education and focusing on respect, full integration and acceptance of diversified backgrounds.

2.10.3 Application of ESD pedagogies on Nubians.

A distinguished feature of the Nubian community is the communal ownership of waterwheels, palm trees, fields and cattle by members of different families. Nubian arts, crafts, and folklore embody and reflect the history and beliefs of this ancient people (Meguid, 2005). Due to the limited economic resources, the Nubians were forced to share them. Economic necessity produced a strong sense of cooperation and solidarity in Nubian society. Since the resettlement process of the early 1960s, during the construction of the High Dam, the Nubian population has faced innumerable challenges related to the maintenance of its culture and traditional ways of life, as well as earning livelihood. In this process of re-adjustment, the rich cultural heritage of the Nubian community suffered from neglect of art and handicraft production as the community adapted lifestyles to cope with a new environment. It is estimated that with the deceased older skilled generation, currently, a minimum number of youth below the age of twenty are knowledgeable about traditional arts and their associated folk and history.

The only informal source of ESD for Nubians is the Nubian Museum in Aswan. In an attempt to revive Nubian handicraft skills, involve young Nubian women in income-generating activities and improve basic literacy, the museum has proposed conducting a nine-month pilot training program to transfer skills and traditional knowledge from senior female individuals to younger Nubian women. The Nubia Museum also plays a significant role in poverty and illiteracy alleviation.
Poverty does not only imply low income but is also related to inadequate access to health, poor quality education and cultural services, and lack of representation in decision-making and political status. With the goal of addressing the root causes of poverty, the museum project focuses on increasing community access to basic services, which aims to enhancing human capabilities in order to improve the quality of life. The project designed by the Nubia museum works in collaboration with local community Development Associations (CDAs); it provides technical assistance in attaining basic water sanitation and education services. The project also empowers CDA in order to act as representatives and agents that voice the needs of the Nubian community and link their communities with other civil society organizations. With the help of the museum, CDA teams and agents receive training in project design and resource mobilization, and engage women in poverty-reduction activities. Furthermore, the museum in collaboration with the Environment Unit of South Valley University in Aswan supports local CDAs in raising environmental awareness in the districts of Nubian villages in Aswan city and forms an environmental network, which identifies the needs of the individuals and develops strategies to respond effectively to these needs. The museum also contributes with community members in finding and developing efficient and feasible solutions to environmental problems such as solid waste disposal, and water and air pollution. Hence, in the future, more collaborative work between local community agencies and international organizations in Nubia and other indigenous communities is expected to fulfill the goals of sustainable development for rural and marginalized communities.

Thus, it is demonstrated that theoretical and practical research in possibilities of implementation of ESD in the Nubian community is crucial. First, it provides opportunities for empowering the indigenous people of Nubia and integrating them in the Egyptian society on the grounds of social justice, and recognition of their unique indigenous culture. Second, the role of education as the basis for long-lasting and continuous sustainable development makes this research significant.
2.11 Theoretical Framework

This research draws on the theory of the French philosopher Michel Foucault (1926-1984) to highlight the role of indigenous knowledge as an empowerment tool. For Foucault, power and knowledge are interrelated. Power is derived from knowledge and knowledge expresses power. Foucault argues that modern society is often controlled through disciplinary means in a variety of institutions; schools is one of them (Longhofer & Winchester, 2016). He believes that educational institutions demonstrate what he calls 'blocks of capacity–communication–power'. Thus, communication and power relations work together to build human capacity and instilling behavior. For Foucault what makes schools different from other disciplinary institutions such as prisons is that they are supposed to focus more on communication rather than power (Foucault, 1982, p. 218-219). This, unfortunately, is not always the case especially when it comes to the exclusion of indigenous knowledge. Nubians, within the framework of Foucault’s theory, could be seen as colonized people seeking their intellectual self-determination which is attained through having a space to practice their teachings and traditions. Unfortunately, this kind of space is denied in Egypt because Nubian students are subjugated to academic practices created by the ‘colonizing’ public education system that refuses to encompass their local culture and heritage.

Therefore, the idea of integrating indigenous knowledge into ESD could be one of the most useful tools to practice power or to resist the dominating system. In other words, the interaction of different sorts of knowledge produce power. That power, in turn, promotes different and new ways of learning and hence better academic achievement and better commitment.

One of Foucault’s most useful concepts for coming to terms with the operation of power through development is the “dispostif”, or concrete social apparatus (Brigg, 2002). The conception of the dispositif and normalization aligns with the idea of integrating Nubians knowledge into the Egyptian society to enhance the academic integrity and promote active learning. This inclination allows development to control students’ lives in a particular way without imposing control over their minds. Hence, applying the theory of Foucault of power on knowledge of Nubian indignity in higher education could cater for a better academic achievement. Foucault’s concept of power
as something exercised by an institution that consists of individuals who are affected by and affect that power can readily be applied to school context where education system is the controlling power and students are the prisoners or slaves (To, 2016, p. 781).

This chapter has argued that the inclusion of IK in education system is an effective tool that proceeds towards quality education. Allowing the local culture of indigenous nations in Hawaii, Brazil, and Australia into school curricula has positively affected the academic level of students. The chapter has also tackled the issue of quality education in the framework of ESD in higher education, stressing that no sustainable economic development is possible without quality education. Place-based learning and hands-on experience have been presented as two effective pedagogical strategies that can contribute to education system improvement. Finally, the chapter has discussed that drawing on Foucault’s theory of power to explore the significance of braiding IK of Nubians into the Egyptian education system emphasizes the role of IK as a liberating and empowering tool to this marginalized community (i.e. Nubians), and a key factor contributing to sustainable development.

The next chapter discusses the methodology of the study, including the questions that the research trying to answer, the role of the researcher, the research design and its limitations.
3. Methodology

This chapter includes a recapitulation of the research questions, the role of the researcher in the study, a description of the research design and its rationale as well as an evaluation of the interview as the research method, and finally the statement of the research limitations.

3.1 Context of the Study

The researcher works in the department of English language under the Faculty of Alsun and Mass Communication in an Egyptian private university. The idea of the study was ignited when the researcher attended courses in the American University in Cairo in which the subject of “Sustainable Development” was tackled in classes. One of the course assignments was to video record and detect some everyday practices in which individuals of society are involved either as active agents or hinder agents for sustainable development. That assignment, in particular, spurred the initiative to further investigate the definition of the terms “Sustainable Development” and “Education for Sustainable Development”. The core concern was to respond to the question of finding the means of applying the goals of Sustainable Development on a group of people who differ in terms of culture, language, political and economic status, and are marginalized or deprived of their basic human rights, according to United Nations’ Goal 4 and The 2030 Agenda for Sustainable Development.

Hence, the researcher decided to investigate some case studies from Hawaii, Brazil and Australia, in which socioeconomic conditions were similar to that of the indigenous people of Nubia. Paying a visit to Nubia contributed to empowering the researcher with a more insightful vision of the terms “indigenous” and “indigenous knowledge”. Although the visit lasted only four days, it was very beneficial. Meeting some Nubians in their home places was effective. The researcher was able to observe and touch creativity in various aspects of the life of Nubians starting from constructing architecturally signified houses and ingenious art crafted households, to full awareness of herbs functions and their use in treatments of different diseases.
In fact, the researcher was able to witness the culture of the indigenous people and the way such indigenousness occurs naturally with the inbred motive towards significance.

Since then, the core of the study was directed to finding the means of relating and integrating indigenous knowledge into higher education in Egypt in order to maintain sustainable development for the future. Nubia is a rich country with its cultural heritage, human resources and land resources as well; therefore, the researcher has perceived its potential role in contributing to sustainable development through integrating indigenous knowledge, quality education and place based learning into Egyptian curriculum especially in higher education. Thus, it was concluded that with the help of active Nubian agents, sustainable development could be achieved as responding to the changing global issues became an urgent necessity. Hence, the researcher examined the cultural and environmental patterns of Nubians as a case study for integrating traditional education with modern sciences while preserving their cultural heritage and indigenous knowledge. The context of Nubia with its rich human, cultural and land resources has provided a perfect environment for introducing a relatively new approach as ESD.

3.2 Role of the Researcher in the Study

The researcher started showing an interest in the topic of sustainable development when the department where the researcher took classes paid a visit to one of the schools whose mission was promoting sustainable development in education. The target’s direct appeal to education inspired the researcher. Believing in the power of indigenous people and their capability to make changes, the researcher thought of the Nubians. Nubia has always been in the core of the researcher’s interests. Moreover, working in the field of education, the researcher was able to elicit how indigenous knowledge – if infused into higher education – could help in attaining the tangible goals of sustained development. This sense of purpose encouraged the researcher to work in this field. Every effort is made by the researcher to stay as objective as possible by following a systematic method of data grouping and analysis.
Moreover, the researcher’s work in the field of education was the reason for developing a special interest in ESD since 2015. The specific area of interest of this research was ESD in higher education curriculum and teacher training. Since the enrollment in human development courses, the researcher was determined to conduct further investigation about the benefits of integration indigenous knowledge for sustainable development in higher education. Indigenous knowledge has always attracted the attention of the researcher due to acknowledging their potential role in sustainable development.

3.3 Research Design

This research is a qualitative diagnostic study that attempts to address the following research questions. (1) What are the insights of Nubian stakeholders (Nubian students, parents, and faculty members) on IK? (2) What are the practical steps for shaping the future of higher education in Nubia that would cater for their indigenous knowledge? (3) What are the challenges, which may hinder the effectiveness of restructuring of the higher ESD curriculum for the Nubian community?

To answer the questions above, the following steps were taken. Firstly, a preliminary informal meeting was conducted among acquaintances and students in the educational institution where the researcher works at the beginning of the semester to understand faculty members’ perceptions indigenous people and indigenous knowledge as well as of SD and ESD. Secondly, based on information collected from the meeting, a follow-up interview was conducted with university staff participants, first, to reflect on their in-class experiences and explore on their knowledge about IK and ESD and specifically about their knowledge about Nubian students; and second, their anticipation of infusing indigenous knowledge into higher education. Thirdly, the students and their parents were interviewed to explore the detailed background information on the idea of indigenous people and their indigenous knowledge.

This approach was used in the study to ensure collecting more accurate data from both the preliminary survey and the interviews as data combined from both instruments are believed to provide triangulation and can increase the credibility and
trustworthiness of the results (Creswell & Miller, 2000). The researcher anticipates that conducting semi-structured, one-to-one interviews would provide an opportunity for deeper conversations with the participants about their understanding of the concepts explored in this study.

3.4 Study Participants

The researcher employed a purposive sampling technique for conducting the interview. The interview was based on a purposive sample of 10 Nubian high school- and five university students, as well as five parents of the same students. A purposive research is a type of non-random sampling that involves the selection of individuals who are available, willing to take part in the study, and able to share experiences and points of view. In such a sampling technique, the researcher decides the kind of information that needs to be known, and look for the people who can provide it either by virtue of their knowledge or experience (Etikan, Musa & Alkassim, 2016).

Accordingly, the participants were of both genders, two males and eight females; their age ranged between 18-20 years old. Eight of these students had an average knowledge of English, while the rest could hardly communicate in English using basic sentences and limited diction. These students came from the Nubians origin and lived either around Nubia or in Cairo. They belonged to diversified social and economic backgrounds; two male students and six female students came from a middle class, while the other two female students came from an upper middle class. Five of those students’ parents also participated in the interview, since they were not only stakeholders, but also the main source of indigenous knowledge and could act as active agents towards sustainable development. They were unofficially regarded as mentors of the younger generation and were responsible for transmitting the knowledge and cultural heritage to their offspring.

Moreover, interviewing university professors provided the study with more knowledgeable and experienced opinions and resourceful information. All of the university professors hold high academic positions. Some of them teach courses which are based on developing students’ awareness of the environment, and others teach history and are highly aware of the Nubian culture and its significance for ESD. Besides, it is communicated in the faculties of some of them that academics have the
autonomy in choosing material and specific teaching approaches. The names of participants and their personal information and occupations were held undisclosed for confidential purposes; IRB and consent forms were encased in the research for the purpose of academic integrity.

3.5 Procedures of the Interview

The researcher selected the interview method over a questionnaire since it is more flexible and credible. The qualitative research interview seeks to describe the meanings of central themes in the research. The main task in interviewing is to understand the meaning of what the interviewees say (Kvale, 1996). An interviewer, based on what the respondents say, moves on with the interview questions. Interviews are a far more personal form of research than questionnaires. In the personal interview, an interviewer works directly with the respondent, unlike questionnaires. Thus, an interviewer has the opportunity to probe or ask follow-up questions. Interviews are generally easier for respondents, especially in what is sought is opinions or impressions. Moreover, the same open-ended questions are asked to all interviewees, which facilitates the interview method process as the results can be easily analyzed and compared. In fact, holding individual interviews allows room for more accuracy and privacy, as any external pressure does not affect interviewees.

The researcher viewed students as the most challenging and effective stakeholders that would contribute to the objective of the research. Therefore, as the first step, the researcher had to establish rapport with the students and parents interviewees in order to ease their tension: it was noticed that most Nubians did not appreciate the idea of being personally interviewed. Hence, the researcher allowed the interviewees to choose any place to their preference where the interviews took place.

The questions asked to the students interviewees discussed their knowledge about Nubia and their means to know about the history of Nubia, as well as their reactions to infusing Nubian culture in the curricula (see Appendix A). There were 28 different questions tackled from the behavioral, cultural, economic and environmental perspective. Language was easy and straightforward. Moreover, the aim of interviewing the students was to find out whether the participant students acquire the
information from textbooks, or from their families, to anticipate the importance of the higher education curricula reconstructing for the effective infusion of indigenous knowledge in higher education development.

The questions intended for the parents were mainly of four different kinds to encompass the elements anticipated to hinder the infusion of indigenous knowledge into higher education. The questions above included the questions about the crucial problems related to Nubia (see appendix A).

As for interviewing the university professors, preparation for the interview required selecting an efficient method of recording, taking notes and choosing a setting with the least distraction, which was determined to be the university campus upon the participants’ choice.

Before starting the interview, the researcher explained the purpose of the interview and confirmed the terms of its confidentiality and the duration of the interview. One of the most important preparation steps of the interview questions was structuring clear, simple, easy and short questions. Scheduled meetings were prepared beforehand with the university professors on campus; however, one of the professors had a very heavy teaching schedule and the meeting had to be cancelled and rescheduled many times. They were about 15 questions; 8 of them were specifically designed for academia (See appendix A). The interviewees were of different genders, three females and two males. The two males work at the same university the researcher works at, while one of the other three females also works at same university, and the other two – at two different universities. The first male professor is an associate professor in the field of modern history, whereas the other professor works as an assistant professor in Mass Communication department. The third female professor is also an associate professor in Mass Communication. The fourth interviewee was a half-Egyptian and half-American professor, who taught the researcher one of the courses. The professor is a consummate professional in the field of sustainable development. The last and fifth interviewee is a professor of the Nubian origin who works in the field of sociology at some other university. The questions with the faculty interviewees were mainly to explore the importance of indigenous knowledge and the expected outcomes of its integration into the higher education
curricula, besides explaining the importance of place-based learning and hands on experience.

Conversing with all three groups of participants was meant to add more credibility and accuracy to the research and to lead the researcher into the theoretical side of the problem and into the means of solving it. All of the interviews were conducted individually, face to face, except for the one that was online (the fourth professor) as she was abroad then. All interviews were recorded using a cell-phone recorder to ensure accurate documenting of each participant’s response, except for one participant who refused recording. Therefore, her responses were noted down. Three of the female student participants were reluctant about recording their responses; however, they were later willing to record their responses after being assured that their confidentiality would not be compromised. One of the interviews was conducted over the phone using note taking, since the interviewee is currently staying out of Egypt. Permissions were sought from the interviewees prior to the interview. Some of them signed the consent form, while others gave their oral consent for being interviewed. The consent form is included in Appendix B, and the official approval from the CAPMAS (Central Agency for Public Mobilization and Statistics) is included in Appendix C.

The total number of the questions put by the researcher were 28. They were categorized according to the addressee (faculty members, students, and parents), and according to the perspective they tackle (cultural, behavioral, economic, and environmental). The maximum number of questions that were answered by a given addressee was eight. Each interview took about 10-15 minutes. Questions listed in Appendix A were piloted before submitting the final version of the paper in relevance with the research questions. The interview questions were in the English language, but were occasionally translated to the students’ parents with poor English language command. The researcher abided by accurate translation of the questions. The interview questions were semi-structured, open-ended ones which required further analysis. This type of questions was chosen because it is usually effective when asking about sensitive matters and can reveal emotions and attitudes (Adams, 2015, p. 494). To ensure the effectiveness and trustworthiness of the interviews, the researcher followed the rules recommended by Dillon, Madden, and Firtle (1994, p. 124) by
avoiding looking superior, asking the questions without bias or putting forward personal opinions into the responses, staying away from yes/no questions, and creating a friendly atmosphere to encourage the interviewees to express their points of view freely. In a topic such as ESD, where there is no one correct definition or interpretation to how it should be applied, participants in a group discussion may get the feeling that they have to agree on what others say in the group. Therefore, it is believed that arranging for individual interviews allows for both feasibility and accuracy of data collection. Furthermore, as Creswell and Miller (2000) indicate interviews serve as “second lens” that can enhance the validity of qualitative research (p. 125). That is why the researcher preferred conducting interviews with Nubian students and parents so as to gain deeper insights into the viewpoints of Nubian themselves concerning the inclusion of IK. This also justifies the resort to purposive sampling that, as Elo et al., (2014) points out, can provide the researcher with adequate information since in such a type of sampling, the participants are expected to be knowledgeable about the research topic. Establishing trustworthiness was a major concern in the study. Every effort is made to meet the four criteria of qualitative research trustworthiness: credibility, transferability, dependability, and confirmability (Nowell, Norris, White, and Moules, 2017).

3.6 Ethical Considerations in the Study

The Institutional Review Board (IRB) application form was handed in to get the approval to collecting data from participants. IRB approval was received before the beginning of data collection (Appendix D). All participants who volunteered to take part in the study signed the IRB consent form besides signing a consent form adapted from Massachusetts Bay Community college’s website (2010) to audio-record and transcribe the interviews in the study without associating names. One participant university professor did agree to sign off the consent to recording the interview, hence has not signed this form. Therefore, the researcher had to take down notes manually in a notebook for this participant. All transcriptions, notes and recordings are secured confidentially on the researcher’s laptop that no one else has access to its password; only the researcher can check the data collected. Moreover, the researcher received an official approval from the Central Agency for Public Mobilization and Statistics
(CAPMAS) to conduct the study in the university (Appendix C). Moreover, before the beginning of data collection, the researcher received an official approval to conduct research on campus from the head of the English department and the Dean of the faculty of Arts and Humanities at the institution where the students were studying.

The interviews results were processed to meet the criteria of confidentiality and accuracy. For the confidentiality of the interviews, codes were given to the interviewees based on their turn in the interview. For example, the first interviewee was given the code ‘A’. Coding the participants is a way to attain the ethical consideration of researching, which the researcher informed the participants of at the beginning of the interview prior to their signing the consent form. The addressees were divided into three categories: academia, students and parents. Each category was presented in a corresponding table: Table 1 for academia, Table 2 for students, and Table 3 for parents. The tables are presented below in a consecutive order.

Table 1

*Academia Interviewees Codes and Details*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Code of the interviewee</th>
<th>Gender</th>
<th>Academic degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academia</td>
<td>A</td>
<td>Male</td>
<td>Associate Professor</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>Female</td>
<td>Associate Professor</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>Female</td>
<td>Associate Professor</td>
</tr>
<tr>
<td></td>
<td>D</td>
<td>Male</td>
<td>Assistant Professor</td>
</tr>
<tr>
<td></td>
<td>E</td>
<td>Female</td>
<td>MA in Sociology</td>
</tr>
</tbody>
</table>
Table 2

*Students Interviewees Codes and Details*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Code of Interviewee</th>
<th>Age</th>
<th>Gender</th>
<th>University Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>F</td>
<td>18</td>
<td>Female</td>
<td>Freshman</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>18</td>
<td>Female</td>
<td>Freshman</td>
</tr>
<tr>
<td></td>
<td>H</td>
<td>19</td>
<td>Female</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>19</td>
<td>Female</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>J</td>
<td>19</td>
<td>Female</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>K</td>
<td>19</td>
<td>Female</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>L</td>
<td>19</td>
<td>Female</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>19</td>
<td>Female</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>19</td>
<td>Male</td>
<td>Sophomore</td>
</tr>
<tr>
<td></td>
<td>O</td>
<td>19</td>
<td>Male</td>
<td>Sophomore</td>
</tr>
</tbody>
</table>

Table 3

*Parents Interviewees Codes and Details*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Code</th>
<th>Age</th>
<th>Gender</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents</td>
<td>P</td>
<td>40</td>
<td>Male</td>
<td>Accountant</td>
</tr>
<tr>
<td></td>
<td>Q</td>
<td>70</td>
<td>Male</td>
<td>Tour Leader</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>55</td>
<td>Male</td>
<td>Translator</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>50</td>
<td>Female</td>
<td>Housewife</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>45</td>
<td>Female</td>
<td>Tour Leader</td>
</tr>
</tbody>
</table>
3.7 Data Analysis

This chapter includes analysis of the data collected from the interviews throughout the study. Each of the four themes, elaborated based on the literature review and implanted in the interview design is analyzed.

Data from the interviews were analyzed based on Creswell’s suggested steps for data analysis in qualitative research (Creswell, 2009). In the first step, data were collected and saved on a Google document that is accessible only by the researcher. In the second step, transcripts were read several times to find matching links and responses. Same responses were grouped together. The grouping of the responses was possible as the researcher classified the participants from the beginning into different categories: students, parents and academia. To attain the thematic approach, the questions were divided according to four different perspectives; these perspectives were sub-categorized into four important themes – cultural, behavioral, economic and environmental – in Table 4 below.
Table 4

*Interview Themes*

<table>
<thead>
<tr>
<th>Themes</th>
<th>Corresponding interview questions</th>
<th>Theme title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme 1. Interview Q. 1,2,6,7,8</td>
<td>Cultural perspective</td>
<td>Perceptions of the elements of awareness to cater for indigenous knowledge in higher school education</td>
</tr>
<tr>
<td>Theme 2. Interview Q 1, 2</td>
<td>Economic perspective</td>
<td>The elements needed to infuse sustainable development in higher education through employing indigenous knowledge</td>
</tr>
<tr>
<td>Theme 3. Interview Q. 5</td>
<td>Behavioral and environmental</td>
<td>Elements that hinder the effectiveness of the infusion of sustainable development in higher education</td>
</tr>
<tr>
<td>Theme 4. Interview Q. 1,2, 6,7,8,9</td>
<td>Cultural and behavioral</td>
<td>Recommendations for a better higher school education which makes benefit from indigenous knowledge and targets sustainability</td>
</tr>
</tbody>
</table>

The results of analyzing the responses of the interviewees according to the above-mentioned theme categorization is presented in the section below.
4. Data Results

4.1 Interview Results

4.1.1 Theme 1: Perceptions of the elements of awareness to cater for indigenous knowledge in higher school education.

Theme 1 was determined by Q 1, 2, 6, 7 and 8 in the interview, the questions tackled the cultural perspective and they were asked to the three groups of participants. Question 1 was addressed to academia, it inquired about interviewees’ acknowledgment of the importance of education and how to spread elements of environmental awareness among Nubian students in higher school education to facilitate more knowledge about their culture. The respondents were four university professors of different majors, and they all agreed on the importance of indigenous knowledge. Participant (A), an Associate Professor of Modern History at a private university showed high understanding of the concept of indigenous knowledge. The professor teaching history courses mentioned that he had a lot of Nubian students who enrolled in many courses at the university. He started narrating the history of Nubia being the oldest civilization prior to the pharos. He mentioned that the students in the university who are of a Nubian origin are very proud of their identity. He also referred to them as a unique generation “whose every citizen in himself is creative”. He referred to the Nubians’ creativity in the field of construction, and in the treatment of diseases by using herbs. He also referred to Nubian figures who excelled in different artistic fields. The interviewees also mentioned the spoken language of Nubians, which was one of the reasons of October’s victory in 1973, when a secret code in the Nubian language was used to announce the zero hour. Another professor coded (B), the Acting Head of Management and Marketing at the same private university, when asked about her opinion on the importance of indigenous knowledge in higher education, she answered rapidly without hesitation, “indigenous knowledge is magic”; she gave an example of one private university, which had integrated the concept of sustainable development through the infusion of indigenous knowledge. Question 2 inquired about the possibility of integrating the ways of native Nubian perceptions with Western scientific ways to detect the best ways of such integration. The interviewee (A) suggested including the culture of Nubians into curricula as “Nubians are very capable of creativity and coping with Western scientific ways”.
As for Questions 6, 7 and 8, the interviewees were both students and academia. Question 6, which was addressed to academia and students, inquired about including the history of the heroism of Nubian people into history books. All participants agreed that it is very crucial to do this as it will help in strengthening their sense of belonging to the country. One of the interviewees (c), who is a researcher and obtained her Masters of Arts in sociology, is of a Nubian origin and did a study on the Nubians people. She said Nubians feel marginalized and hence they do not have the sense of belonging to Egypt. She referred to the research paper she conducted on Nubians and said that she did a questionnaire, where one of the questions was to choose among the answers: “Are you Egyptian Nubian, or Nubian Egyptian, or Nubian only?” They all responded “Nubian only”. Hence she believes that it is really important to “drag their sense of belonging to the country; and one of the best ways to do this is to include their history in textbooks. Questions 7 and 8 are related to each other; the questions inquired about the role of educators to enhance cultural awareness about Nubia among its people and how this can help in infusing sustainable development. The four educators responded positively to the questions that educators have a vital role in this process and mentioned that the best way to learn in the place-based approach where students address issues related to the place by themselves, is paying visits to places which are neglected like the forgotten land. Field trips to the forgotten land Nubia could be of good use for promoting the sense of sustainability importance. However, Interviewee (B) added that “already the university where I work in as a professor is holding courses like “environmental awareness” in which they teach students about indigenous knowledge and how it enhances sustainable development. In those centers students study the relationship between environment and sustainable economic growth. They discuss environment pollution and depletion of natural resources that creates problems for the next generation.

4.1.2 Theme 2. The elements needed to infuse sustainable development in higher education through employing indigenous knowledge.

This theme was determined upon Q. 1 and 2 in the interview. The questions tackled the economic perspective and they were asked only to university professors. In Question 1, interviewees were asked about the ways to incorporate different ways of understanding land sciences for Nubian students. The question was addressed to the
university professors. Participant ©, who is an Associate Professor of Practice in some other private university, stated, “Concerning Nubia, it is a very rich source for traditional medicines that cure diseases. The stories of old women preparing the herbs to use them for treating diseases are well known, such a science could be integrated into curricula”. The interviewee who showed great interest in the question added, “It is a kind of indigenous knowledge that moderns me”. She summed up the interview by suggesting that indigenous knowledge should be implemented in a way that benefits the modern age.

The following quotes express some of the interviewees’ comments.

- “Education is an important element for infusing sustainable development.” (Interviewee C)
- “If we as Egyptians make best use of indigenous knowledge, we will attain sustainable development.” (Interviewee A)
- “At all times, Nubia was a center of attraction to invaders like Mohammed Ali and Khedive Ismail.” (Interviewee A)

All respondents agreed on integrating ESD into the curriculum and implementing indigenous knowledge as a part of understanding land sciences and involving Nubians in the process not only as normal students but as interactive agents.

4.1.3 Theme 3. Elements that hinder the effectiveness of the infusion of sustainable development in higher education.

Question 5 in the interview was about the elements that hinder the infusion of ESD pedagogy. The question tackled both perspectives, the environmental and the behavioral one. The interviewees were both university professors and students. Most of the respondents agreed on same elements. 1. The negligence of the importance of indigenous knowledge with special focus on Nubia. 2. The neglectfulness of the role of language in creating independent generations capable of enhancing development. 3. Marginalizing Nubians as indigenous people and depriving them from all their human rights. 4. Lack of data that document the history of Nubians. 5. Absence of highly
equipped schools in Nubia or in nearer areas. The following are quotes from the interviews with university staff and students that reflect each difficulty as ordered.

- “The government totally ignores the role of indigenous knowledge; Nubia is a very rich country in resources.” (Interviewee C)
- “Language is another approach to indigenous knowledge. Nubians have their own language, which has been silenced. Education has unfortunately led to the destruction of spoken language. UN has to preserve spoken language.” (Interviewee C)
- “The Nubian language was used during the October war and it was one of the reasons of victory; however, this was not mentioned at all in any history course book.” (Interviewee E)
- “My classmates at school recognized me as a Sudanese as they knew nothing about Nubia before I told them.” (Interviewee E)
- “The right of self-expression is a third approach to indigenous knowledge. It is important to listen to the indigenous people to let them reveal what they want to say. We are teaching morals and ethics and its simplest rule is to be an active listener. Active learning needs to be an active listener.” (Interviewee C)
- “Nothing is mentioned about Nubians in history books.” (Interviewee E)
- “Schools are very poor; teachers are unqualified, especially who teach English.” (Interviewee F)

**4.1.4 Theme 4. Recommendations for better higher school education benefiting from the indigenous knowledge and targeting sustainability.**

The questions 1, 2, 6, 7, 8 and 9 were addressed to students and university professors. The questions appeal to the cultural and behavioral perspectives. For students, the required recommendations for the best ways to infuse environmental awareness were alike: integrating their indigenous knowledge in the curricula and listening to their demands.

- “I need to know about my country from books and not from my grandfather” (Interviewee ‘H’)

The above interviewees gave a very effective response when asked about the possibility of committing the Egyptian government to a progressive study of native Nubian culture, history or language (Q 9).

(Interviewee C), for instance, replied that “The right of self-expression is the third approach to indigenous knowledge. It is really important to listen to the indigenous people to let them reveal what they want to say. As teachers, our duty is to listen to our students and this is one of the morals.” She added that at least the government should listen to their demands even if they are not fulfilled now; she also added that rural areas have always presented creative agents. “Beni Sueif is an example of a small city that has indigenous knowledge in the construction building” (Interviewee C).

Another respondent (D), an Assistant Professor at Mass Communication and Alsun at some private university, when asked about the role of educators in enhancing cultural awareness (Q 7) showed great enthusiasm in responding to the question, as he submitted many papers under the topic of sustainable development and its linkage to indigenous knowledge. He replied that there should be more courses assigned for infusing environmental awareness among students. One of the best ways is to apply the place-based experience where students go for field trips and observe and illicit experience by themselves.

The following are some extracts of the interviews:

- “Bedouins of Sinai developed an insightful knowledge of environmental awareness and are now able to protect their land and develop special skills.” (Interviewee D)
- “There are three approaches to Nubian Indigenous Knowledge; first is through their rich resources of traditional medicines (herbs) second is through their language and third is through allowing them to express themselves as real citizens.” (Interviewee C)
- “The Nubian old man is a bank of information; their indigenous knowledge is unique”

It is apparent that integrating indigenous knowledge could help to a great extent in the infusion of sustainable development.” (Interviewee P)
Before moving to the next section where discussion and conclusion are presented, it is worth mentioning that the researcher visit to Nubia was as illuminating as the interviews conducted, though this time it is from an anthropological scope. The researcher was able to look at the Nubian culture as more than just a subject of study, and to understand the shared set of values, concepts, and traditions from the perspective of the community that is being studied. The visit allowed the researcher to discover key dimensions that may have not been clear had the researcher been limited to the interviews. In other words, the visit gave the researcher the chance to perceive the world through the “Nubian lens”. Among the aspects revealed during the visit are those related to the Nubian architectural designs. Nubian houses envisage preeminent traditional culture; the houses are built of mud bricks to resist heat. All houses have domes to distribute the sun heat inside the house, as mentioned by Nubian residents. This observation has provided the researcher with insights that such designs, if integrated into the Egyptian educational system can trigger better attempts to design resorts in Egypt express the identity of the place and save energy (Omar, 2015). Another interesting aspect that the researcher managed to know about during her stay in Nubia is that the Nubians are fascinated by herbal plants especially Henna. They use it for different purposes not only for cosmetic ones. Henna to Nubians can treat fungal infections, inflammations, stop diarrhea, and fight against the poisonous effects of snake bites. Again, such tradition can be generalized if it is integrated into the educational system. The kind of food preferred by Nubians is also among the components of their indigenous knowledge. Eating healthy food, mainly vegetables, is one of the lifestyle aspects the researcher observed during the visit. In a nut shell, the infusion of Nubian tradition into ESD could help, to a great extent, to enhance understating levels and promote development in different fields in education.

In the following chapter, discussion about each research question is provided and interpretations of the findings are given with the literature review and the theoretical framework.
5. Discussion and Conclusion

The data collected are interpreted through investigating literature reviews about indigenous knowledge and its relation and impact on SD and ESD. Analysis of data is performed by linking the results presented in the previous chapter to the research questions and the literature reviewed, and the proposed theoretical framework in Chapter 2. Answers to the research questions are provided based on the data collected and analyzed throughout the study. At the end of this chapter, research limitations are mentioned and recommendations for future research are presented.

Each theme of the research addressed in the interview was revealed in the answers of the participants of the study. The first theme is presented via the corresponding research question.

5.1 Discussion of the Results of RQ 1

What are the perceptions of Nubian stakeholders towards IK?

Based on the interview results, high school education in Nubia seemed to provide poor education; however, conscience of the participants to this deficiency is high. All student interviewees and faculty agreed that higher school education needs radical change and hence mere relying on the indigenous knowledge implemented in higher school curricula would not fulfill the targeted effects unless radical reform in education occurs. Radical reform should be related to the methods of teaching, in curricula constructing, in making best use of indigenous people through integrating their knowledge into the spheres of education. Education systems in the Arab countries lack connectivity to the environment; they are more theoretical, which in its turn decreases their capacity to achieve the desired goals of ESD (UNESCO, 2008). It is emphasized that education is the first step towards a successful future (as cited in EL Deghaidy, 2016). The researcher believes that interviewees’ perception, especially faculty’, of the importance of a well-based system of high education, which is linked to the catering of indigenous knowledge, is a positive step. This corresponds to the opinions widely articulated in the literature that one of the obstacles that hinder the infusion of sustainable development is the lack of awareness (as cited in EL Deghaidy, 2012). Analysis of the interviews also shows that not only faculty members realize the
crucial role that education plays towards promoting ESD through infusing it into higher education, but also students and their parents. However, students and parents still need to value the interrelated environmental, social and economic perspectives of sustainable development. In addition, the results indicated that indigenous individuals perceived the importance of their roles as mentors and active agents towards ESD. However, the interviews showed that radical change in teaching approaches and curricula is needed in order to meet ESD goals. To promote educational sustainability, the former should ensure developing practical connection of the curricula and education in general to the environment of the potential students. This consideration agrees with a study conducted by Hussein (2010), which argues that indigenous people can largely contribute to environmental conservation to meet one of the most important goals of education - life conditions improvement. Hence, the critical step towards sustainability is raising awareness of indigenous people of the value and ESD. The researcher believes that the interview questions have signified a clear perception of the importance of ESD, and the dire need for a radical change in education if indigenous knowledge is integrated into the curricula. This could be seen as the kind of change that Foucault talks about when he refers to colonized nations as people seeking liberation from the dominating system (1982, p. 218).

5.2 Discussion of the Results of RQ 2

What are the practical steps for shaping the future of higher education in Nubia that would cater for their indigenous knowledge?

The 20 participants (students, faculty, and parents) agreed during the interview on the same methods to better education in a way that caters for sustainable development. They all noted that in the case of Nubia, the approach to IK could be achieved through its land resources as well as language; except for one participant who referred to one important approach, which is the freedom of expression and freedom of decision-making. The researcher believes that this is because this participant is a professor in the field of history and has many Nubian friends who are of high ranks in the Egyptian society. ESD should also share the values and principles that underpin sustainable development, promote critical thinking, problem solving and action, all of which develop confidence in addressing the challenges to sustainable
development. As for place-based learning, which includes both informal and non-formal education, the Hawaiian case is considered a successful case due to improvement in academic achievement and more regular attendance of students as the case integrates different educational methods that relate students to their environment and every day activities while linking them to sustainable science education. Hence, this model can be applied onto the curriculum in order to employ Nubian IK in a manner that would preserve the Nubian culture, identity, language and make use of their rich land resources. Moreover, active Nubian agents should contribute to decision making and designing of educational programs. The above confirms the importance of transforming the Nubians from objects of education into its subjects. This matches the opinion expressed by Foucault in which he argues against the traditional relation between teachers and students where the latter are controlled by the former (Foucault, 1982, p. 221). According to literature, “The opportunities emphasize the need for greater education involvement that goes beyond awareness and factual transmission of knowledge (El Deghaidy, 2012, p.5). As for the language, the researcher found out that all parents of interviewees expressed their deep grief for the loss of their language which, if retained, would promote restoring the Nubian connection to the land and their dignity, becoming hence a great element of employing indigenous knowledge. As pointed out by Chinn (2011), “What a loss that we still have our language but not the land to tie it to there” (p. 51). The most significant finding when asked the participants about the elements needed to cater for indigenous knowledge is language. They referred to how their language is significant and how elderly people are still using it till now. Hence the researcher deduced that if Nubians were able to retain their language by means of integrating it into the curricula this would add much positivity to the infusion of sustainable development as same step was applied in the Hawaiian experiment. Therefore, the above mentioned aspects are clearly the elements that would help in engaging indigenous knowledge in Nubian communities towards the welfare of their community.

5.3 Discussions to the Results of RQ3

What are the challenges, which may hinder the effectiveness of the restructuring of higher education ESD curriculum for the Nubian community?
Based on the findings of the interviews conducted with the three categories of participants, it was indicated that Egypt still has difficulties in infusing ESD in its higher education due to lack of awareness among staff members who follow traditional methods in teaching. This confirms the existing research. Thus, El-Awamri (2015) concludes in his study that there is a general lack of awareness of sustainability literacy in Egypt. Sustainable development has yet to become a major strategic parameter of university life that links the business, learning, research and community functions of institutions which is a measure of the scale of the challenge such institutions face (Scott 2006). Many universities regard that integrating education for sustainable development (ESD) into their core activities is essential (Martin et al., 2006; Weenen, 2000). Besides, the interviews have indicated that ESD is not properly implemented in Egyptian universities. Although many efforts have been exerted to promote ESD in Egypt and integrate it in different areas of curricula, Egypt is too far from implementing ESD (Biasutti & Frate, 2017). Therefore, it is a challenge to apply ESD due to a number of factors including the lack of advanced material and resources which can be employed for SD in Egypt. Another factor is the limited awareness of parents and students about the importance of ESD and their reluctance to change. According to Johnston (2007), lack of strategic leadership, low demand from most internal and external stakeholders, including students and employers, poor communication regarding the concept of sustainable development and the way it applies are considered challenges that hinder applying ESD approaches in higher education. In addition, according to other researchers, one of the most obvious challenges is the difficulty of infusing the idea or notion of sustainable development into the curriculum across the various disciplines. Apparently, the number of students having increased over the last decade, requires better internal management. On the other hand, the administrative structures lack the means to cater to this increase besides failing to accurately determine the amount of time that is required to make changes since it needs a long period of time to become successful, which confirms the existing studies (Lozano, 2009). Furthermore, it is concluded in line with other studies the lack of resources to implement the existing research agenda for Higher Education Sustainable Development also delayed ESD within the institutional setting (Hopkins, 2005). Besides, the interview data demonstrate that very often infusion of sustainable development in education depends on educators’ personal judgment and the value he/she places on the concept of sustainable development. This corresponds to the
existing research findings that the barriers of the incorporating of sustainable development in teaching are mostly related to the irrelevance of sustainable development to some disciplines within the curriculum or related to the teachers’ personal beliefs (Cottona, 2009). Another constrain is the tension or conflict between top-down and bottom-up approaches. For instance, only few faculty members believe that direct support and instructing would provide a positive impact on sustainable development. Besides, inclusion of indigenous knowledge in the curricula is often done without explaining its relevance to the needs and personal benefits of the participants of the educational process. This is also shown by Hopkins (2005), who considers institutional awareness, support, and resources as serious challenges. He explains that national curriculum hardly acknowledges sustainability, which results in unavailability of trained teachers or ESD certification guidelines. Other constraints worth mentioning include lack of funding and material resources, lack of national and local policy to support ESD; lack of an institutional willpower to promote creativity, innovation, and risk-taking, which are necessary to support education for sustainability. Another important challenge in ESD implementation in Nubia and Egypt is related to existing local and national partnerships programs, since the latter are often developed without local community participation or involvement of other stakeholders making such programs disconnected from- and irrelevant to the local context. This adds to the dis-coordination of efforts among Ministries of Environment, Education, Health, and Agriculture. This last point is directly related to colonizer/colonized relation envisaged by Foucault. In Egypt the curricula are developed without involving society members and so the education system fails to account for the needs of all individuals. In other words, knowledge is conveyed to students through power in a way that leaves no room for flexibility or freedom.

Yet, the opportunities that can be gained from applying the approaches of ESD in higher education definitely overweigh the challenges discussed above. According to UNESCO (2005a), ESD can be achieved through improving access and retention in quality basic education, reorienting existing educational programs to address sustainability, increasing public understanding and awareness of sustainability, and providing training to advance sustainability across all sectors. Moreover, UNESCO (2006) declared that ESD should be embedded in the curriculum in an interdisciplinary and holistic manner allowing for a whole-institution approach to
policy making. It should also employ a variety of educational methods, allow learners to participate in decision-making on the design and content of educational programs and address local as well as global issues. It should be ensured though that the content complies with a long-term perspective based on medium and long-term planning. Based on the interviews findings, all responses agreed upon the necessity of redesigning programs that would promote decision-making, critical thinking, problem solution and active learning. Moreover, education should raise public awareness to global problems and environmental issues preparing students to respond to the needs of the market and to become active participants in policymaking.

5.4 Limitations of the Study

The following limitations in this study might have influenced the results. First, the sample used in this study is a purposive, small-sized sample which may not be an accurate representative for indigenous students and individuals. It was also difficult to reach these students, since they represent a minority in Egyptian schools and universities. Yet, the researcher works in a private university where there are some students of Nubian origin and hence it was feasible to arrange face-to-face interviews with them. Also, some participants, mainly the parents, were not fully aware of the concept of both SD and ESD and were hesitant in their answers. So the researcher had to explain the term sustainable development in a simple way to them. These factors may have affected the results of the interview and have limited the generalizability of the results. Besides, the researcher encountered some Nubian individuals who expressed bitterness due to having been marginalized for a long time and been excluded from the political life in Egypt. That made the role of the interviewer difficult as she had to soothe their sadness and/or anger. Moreover, the professors interviewed for the professional opinion work at the same university with the researcher, which might have affected the objectivity of the participants’ responses. The later may be a factor contributing to the increased bias in the analysis of the findings. The study was conducted in two different private universities and in two different departments. However, other departments and faculties and their various courses need to be involved in the study in order to follow an inter/cross-disciplinary approach. The time allocated to plan and schedule the interviews was limited and did not suit some participants from the university, which led to a fewer number of
interviewees. Time was also a constraint due to participants’ loaded schedule or family obligations, which also reduced the number of available participants - contrary to the initial plan. To overcome that, the researcher set the interviews with professional academics to collect the most efficient data. In addition, traveling to Nubia was hectic due to the journey that took four days, hot weather and arrangements for site visits.

The researcher believes that shifting from the original plan of the study has negatively affected the time available for intense discussions about successful case study and possible changes in pedagogical approaches to meet ESD goals. Nevertheless, the researcher overcame these issues by interviewing selected groups of students, parents and academics who were all aware of the problem and offered many suggestions the researcher had referred to them in the recommendation.

5.5 Recommendations

The research methods employed in this study can be developed in future research but with special focus on the limitations mentioned above. In order to attain ESD, there is need for further research on how to integrate ESD by educators in different disciplines in place of traditional education. Second, to increase accuracy of the interview results and reduce possible bias, it is recommended that an external researcher who is not affiliated to his/her workplace conduct interviews. Lastly, it is recommended that senior educators and administrators at the top hierarchy of the higher education institutions need to be included in future development workshops, since they have the power to implement changes in curriculum and pedagogy and to follow up the progress and change that occurred as a result of the teacher training programs.

5.6 Conclusion

This study explored the importance of infusing indigenous knowledge in order to achieve ESD. The marginalized community of Nubia was the scope of study; therefore, the researcher examined cases with similar conditions from Hawaii, Brazil and Australia, in which indigenous knowledge was integrated into educational programs besides emphasis on place-based learning and hands on experience. These
successful cases were examined in order to draw a connection of the possibility of applying the same strategies. The interview results have denoted both the challenges of applying IK and the recommendations that were suggested as a means to reform the education programs and improve the curricula. The study reinforces the notion that sustainable development literacy requires understanding of ecological, social and economic issues in order to meet the continuous global changes. SD is not meant to be implemented in class only; it is about educating the population and involving all community individual into activities that promote current and future sustainability for the country and its indigenous communities.

5.7 Suggestions for Future Research

Research that is more thorough is needed in the area of approaches toward ESD, since the concept of ESD is relatively new in Egypt and has been only introduced to academics in Heliopolis University and The American University in Cairo. ESD pedagogical practices should be set and practiced by trained teachers. Moreover, for better implementation of ESD in universities, more joint-research interdisciplinary projects are required in higher education. Academic institutions should draw closer attention to integrating place-based learning, hands-on experience and field trips into curriculum to promote creativity and encourage students to adapt to situations similar to those in real life. Another suggestion is to conduct a comparative study between traditional Egyptian universities and the ones with a powerful and clear SD agenda to explore different methods of putting this agenda into practice. Furthermore, future research can study the relationship between ESD and preserving of cultural heritage, achieving economic development in all domains, attaining human rights, participating in political life and establishing peace in the whole world.
Referências


Rosado-May, F. J. (2013). Indigenous education. Which way to go? The intercultural model for higher education developed in Mexico, II International Meeting
Canada-Mexico on Indigenous Education, University of Lethbridge, 2013, Canada.


## Appendix A: Questions of the Semi-structured Interview

<table>
<thead>
<tr>
<th>Addressees</th>
<th>Cultural perspective</th>
<th>Behavioral perspective</th>
<th>Economic perspective</th>
<th>Environmental perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academia</td>
<td>1. In brief, what is the current status of education in Egypt?</td>
<td>1. Internationally, people are very interested to know about Nubian culture, why not the same in Egypt?</td>
<td>- In general how to incorporate different ways for understanding land sciences for Nubian students?</td>
<td>1-How can environmental awareness be spread among students?</td>
</tr>
<tr>
<td></td>
<td>2. Do you believe in the intergenerational interactions as a mean to support the college students with cultural knowledge of their environment?</td>
<td>- Is it possible to integrate native Nubian and traditional ways of understanding with western scientific ways of understanding? Do you have any suggestions?</td>
<td>- Is it possible to integrate native Nubian and traditional ways of understanding with western scientific ways of understanding? Do you have any suggestions?</td>
<td>2- What are the best ways to infuse environment awareness as a mean to sustainable development in academic life?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3- Agriculture is one of the main industries in Nubia, how can we link it to Nubians’ education?</td>
<td></td>
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</tr>
<tr>
<td>Nubian parents</td>
<td>3. If you have to take your son/daughter for nature walk in one of Nubia’s spots, where would be that place and why? What would you like to say and do, why?</td>
<td>2-When was the last time you visited Nubia? And which places you liked there and why?</td>
<td>3. What do you know about Nubia environment that could make it different from any other place? How did you get this piece of information?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-Internationally, people are very interested to know about Nubian culture, why not the same in Egypt?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students of different genders</td>
<td>4-What do you know about Nubia?</td>
<td>4-Can you define these three words with relation to Nubia? The words are: education,</td>
<td>4. Do you wish to read a chapter in a book or to find pages in one of your school books</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-What obstacles do you think are facing</td>
<td></td>
<td></td>
<td>4. What does the term environment mean to you?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5. How can you relate</td>
</tr>
<tr>
<td>Academic and students</td>
<td>6- Do you think it is important to include Nubian history in books as well as the heroism of its people? Why do you think it is important?</td>
<td>5- Which way in learning do you believe is more interesting to you to know about the land; class discussions or outdoors surveying?</td>
<td>6- If you are asked to live in Nubia and to help in regaining its status through any of the ways you like… will you do this? Why?</td>
<td>7- In an era of sustainability, how can educators enhance cultural awareness about Nubia for college students?</td>
</tr>
</tbody>
</table>
Appendix B: Consent Form

Documentation of Informed Consent for Participation in Research Study

**Project Title:** indigenous knowledge; an escort to the infusion of sustainable development in Education

**Principal Investigator:** [Ekbal Mohammed Mokhles].

Graduate student at the American university in Cairo applying for the master’s degree in international and comparative education.

*You are being asked to participate in a research study. The purpose of the research is to provide claims that incorporating the principles of sustainability and characteristics of cultural identification of students into high school curricula is the key to social and economic development. The findings may be published and presented. The expected duration of the participation is almost 30 minutes or may be more and this depends on the availability of the participants.

The procedures of the research will be as follows interviews will be conducted with educational experts; students of Nubian origins as well as parents. The questions will be open ended and some are close ended. The structure of the qualitative interviews will probably be semi-structured.

*There will not be* certain risks or discomforts associated with this research.
*There will be benefits to you from this research. The findings will suggest the type of recommendations for the feasibility of the objective of the study which will benefit educators, policy makers as well as students and in specific Nubian students.

*The information you provide for purposes of this research is confidential.

Questions about the research, my rights should be directed to Ekbal Mohammed Mokhles at 01000050139.

*Participation in this study is voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or the loss of benefits to which you are otherwise entitled.

Signature  ________________________________________

Printed Name  ________________________________________

Date  ________________________________________
Appendix C: CAPMAS Approval
Appendix D: IRB Approval

CASE #2017-2018-116

To: Ekbal Mokhles
Cc: Dena Riad & Salma Serry
From: Atta Gebril, Chair of the IRB
Date: March 8, 2018
Re: Approval of study

This is to inform you that I reviewed your revised research proposal entitled “Indigenous knowledge: an escort to the infusion of sustainable development in education” and determined that it required consultation with the IRB under the “expedited” category. As you are aware, the members of the IRB suggested certain revisions to the original proposal, but your new version addresses these concerns successfully. The revised proposal used appropriate procedures to minimize risks to human subjects and that adequate provision was made for confidentiality and data anonymity of participants in any published record. I believe you will also make adequate provision for obtaining informed consent of the participants.

This approval letter was issued under the assumption that you have not started data collection for your research project. Any data collected before receiving this letter could not be used since this is a violation of the IRB policy.

Please note that IRB approval does not automatically ensure approval by CAPMAS, an Egyptian governmental agency responsible for approving some types of off-campus research. CAPMAS issues are handled at AUC by the office of the University Counsellor, Dr. Ashraf Hatem. The IRB is not in a position to offer any opinion on CAPMAS issues, and takes no responsibility for obtaining CAPMAS approval.

This approval is valid for only one year. In case you have not finished data collection within a year, you need to apply for an extension.

Thank you and good luck.

Dr. Atta Gebril
IRB chair, The American University in Cairo
2046 HUSS Building
T: 02-26151919
Email: agibril@aucegypt.edu