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Exploring the Ability of Montessori Education to Achieve Sustainability and
Global Citizenship Education

EDUC 5290

MA Capstone

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Abstract

This research is exploring the ability of Montessori education in providing the children with skills that education for sustainable development and global citizenship education are calling for. The approach of this work is based on literature review. This research seeks to find an answer to three questions which are the following: To what extent does Montessori education, which became popular in Egypt recently, help in providing the young age children with skills that education for sustainable development is calling for? Does Montessori education have the potential to change the behavior of individuals and societies and provide them with skills that global citizenship education is calling for? And to what extent are the skills investigated in this research related to 21st century skills? A review of Montessori education literature was conducted to have a deep understanding of the type of skills acquired by the child. It was found that Montessori education supplies the children with part of the skills that education for sustainable development is calling for. Moreover, Montessori education assists in changing the behavior of individuals and societies and in providing them with skills that global citizenship education is calling for through embedding the children with the skills of critical thinking, independency and confidence that help in fostering the ability of the children to perform with moral courage. Finally, the skills that are related to the 21st century skills are critical thinking, problem solving, global and local citizenship, decision making and personal and local responsibilities. These skills were part of the skills that Montessori called for and are also part of education for sustainable development and global citizenship education are calling for.

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1 Introduction

1.1 Background

The quality of education is an important feature to build knowledgeable citizens who can help in developing their country. Also, high quality education equips the students with the 21st century skills that help them to achieve high status and take decisions that boost their country. High quality education is important to pursuit sustainable development (EduCamp, 2016). In the 2014–2015 World Competitiveness Report, Egypt was one of the lowest ranked countries in terms of the quality of primary education, it was ranked 141st out of 144 countries (Assaad & Krafft, 2015). Education in Egypt is facing several challenges that affect its quality, some of these challenges are the infrastructure, teaching professionals and pedagogical methods. The used pedagogical method is one of the challenges that hinder the students in developing their skills because it is based on memorizing rather than encouraging students to participate in critical thinking activities (Abrahart, 2003). Moreover, the evaluation methods, which depend on the examination grades to acquire information about achieved educational level, are hindering critical skills and retarding creativity (Fergany, 2009). This challenge causes skill shortage, which is considered a limitation on growth opportunities (Loveluck, 2012). There has been an essential shift for the skills that are needed for the work field. They moved from manufacturing skills to information and knowledge skills. Today, most of the success lies in the ability to solve problems, creativity, communication and critical thinking (Pacific policy research center, 2010). Education is considered the main tool that provides people with skills that can help in meeting these challenges (Pacific policy research center,

2010). Neglecting these skills is one of the reasons why Egypt is placed in the 90th place out of 145 countries in the World Bank's Knowledge Economy Index (El-Deghaidy, 2014). International tests, such as Trends in International Mathematics and Science Study (TIMSS), illustrate clearly how limited students in Egypt are doing (El-Deghaidy, 2014). The education system needs to be reformed in order to enable the students to graduate with knowledge and skills that are needed to improve the country's economy, social life and to compete in global markets. .

In a globalization era, education is putting stress on the importance of values, communication skills, and attitudes as a critical complement to cognitive knowledge and skills. Moreover, education plays a significant role in helping students to understand and resolve social, cultural, global and political issues. In addition, education has an important role in supporting peace, human rights, equity, acceptance of diversity, and sustainable development (UNESCO, 2013). As a result, people need a different kind of education that helps in accepting diversity and tools that help in solving global challenges. Students should be prepared for the challenges that globalization present. Education supreme goal focuses on encouraging acceptance and respect, knowledge and understanding, communication and working with people of different cultures. Global citizenship education (GCED) and education for sustainable development (ESD) are new international calls for improving the quality of education. In December 2002, the United Nations General Assembly, through its Resolution 57/254 meeting, declared a Decade of Education for Sustainable Development (DESD), 2005- 2014, highlighting the importance of education for achieving sustainable development. It also nominated UNESCO as the lead agency for the promotion and implementation of this Decade

(Decade of education for sustainable development, 2016). As mentioned by UNESCO (2016), Education for Sustainable Development (ESD) allows people to obtain the knowledge, skills, attitudes and values essential to shape a sustainable future (UNESCO, 2016). Based on the Expectations of the Decade of Education for Sustainable Development (DESD), 2005- 2014, the aim of the decade was focusing on improving the quality of education. It will start with basic education by focusing on skills, values and sharing knowledge that encourage sustainable livelihoods. Also, it will focus on revising education from nursery school through university and building public understanding and awareness and providing practical training to all sectors to apply in the workforce with the knowledge and skills necessary to make decisions in a sustainable manner (Decade of education for sustainable development, 2016). In addition, global citizenship education became a new international call that helps learners to develop skills and knowledge that are useful for their future and encourage them to become actively involved in a sustainable world. One of the goals of global citizenship education is that, as mentioned in UNESCO (2013), it supports the learners with skills that help them to face and solve global challenges and become active contributors in a sustainable world. Moreover, global citizenship education provides students with the capability to understand their rights and responsibilities to promote a better future (UNESCO, 2013). Improving the quality of education is the goal number 4 that the 2030 sustainable development goals are pursuing. Also, Global citizenship education GCED and education for sustainable development ESD are providing the students with tools that help them to face the future. Recently, in Egypt, the Montessori education became more popular especially for the young age. Montessori education started in Egypt in 1994 according to a case study by

Kouchok (2008) on identifying areas of action and best practices to enhance quality learning in Egypt. A school was selected based on the best practice, which adapted Montessori methods in teaching for kindergarten starting from 1994 to suit the Egyptian culture (Kouchok, 2008). The American Academy for Training Courses (AATC), which is ISO-9001 accredited language learning and training center collaborating with Atlanta Institute and is one of the largest teaching & learning centers all over Egypt, is offering Diploma in Montessori Preschool Teacher Diploma (MPTD) (The American Academy for Training Courses, 2016). Also, there is a teacher and parent training on Montessori philosophy and practical implementation by International Montessori Foundation (IMF), which is a franchise of Modern Montessori International (MMI), London (International Montessori Foundation, 2016). Maria Montessori developed an interactive curriculum that changed the traditional classroom model (Ültanır, 2012). Montessori education is considered as a leader in advocating for global citizenship education using scientific pedagogy based on the observation of children's development. In addition, this education held the key to encourage children's understanding and appreciation of different cultures and causing a worldview that encourages understanding and working with people from different cultures and countries (Conesa, 2010). Montessori education could change the character and could give the child some skills (Duckworth, 2008).

1.2 Problem statement

In Egypt, a reform that helps in improving the quality of education is needed to provide the students with skills that will help them to compete in the job market. Poor quality of education in Egypt is an essential factor that extended the gap between the skills that a

student acquires and those required by the labor markets (El Nashar, 2012). Providing the students with skills is the Sustainable development seventh target of goal number 4, which is “By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development” (Sustainable Development Goals, 2015). Education for sustainability provides the learners with skills that support them to take positive actions towards environmental problems and to have critical understanding of how complex systems like ecosystem and sociopolitical systems work. This understanding has been developed in the Montessori education context (Lewis & Boudoins, 2007). Recently, in Egypt, the Montessori education became more popular especially for the young age. Montessori believed that the first few years of life are considered the most formative and important period for the child to develop physically and mentally. The kind of person the child will become will be established by proper learning methods from birth to six years of age (Hainstock, 1997). Montessori’s methods fostered imagination for the learners and that happened through allowing the children to explore their interest and passion. As a habit of critical thinking and independence, a peaceful world will exist because it will provide a manner of protection (Boulding, 1979 as cited in Duckworth, 2008, p. 35). These skills help them to understand the global complexity of the society and to acquire abilities that assist in developing their creativity, which will help them in responding to future challenges. These could be some skills that global citizenship education and education for sustainable development are calling for, or

maybe not, there could be other skills that the educators could build upon in the next educational period.

1.3 Research questions

It is on this premise therefore that this research project seeks to reveal the extent to which the Montessori education provides children with 21st century skills that both education for sustainable development (ESD) and global citizenship education (GCED) are calling for by posing the following research questions:

- To what extent does Montessori education, which became popular in Egypt recently, help in providing the young age children with skills that education for sustainable development is calling for?
- Does Montessori education have the potential to change the behavior of individuals and societies and provide them with skills that global citizenship education is calling for?
- To what extend are the skills investigated in this research related to 21st century skills?

1.4 Purpose of the research

This study seeks to reveal the extent to which the Montessori education provides children with 21st century skills that both education for sustainable development (ESD) and global citizenship education (GCED) are calling for. To achieve this purpose, the literature review section will be divided into four parts. In the first part, Montessori education will be introduced and some of its related aspects will be covered in order to develop deeper

understanding about the method. The second part will introduce the relationship between Montessori education and education for sustainable development through covering some related points. Starting with environmental education, which Montessori was calling for, to illustrate the connection between Montessori education and education for sustainable development. Then, the definition of education for sustainable development will be introduced. After that, the concept of education for sustainable development will be introduced from Montessori's perspective. The third part will introduce the relationship between Montessori education and global citizenship education. This part is divided into the definition of global citizenship education and education for peace. The last part will define the concept of the 21st century skills, introduce the 21st century framework and highlight the skills that are introduced in order to have an idea about the skills covered in Montessori education and what are the skills that are still needed?

2 Methodology

2.1 Research Approach

The paradigm that is used in this study is based on a thorough literature review. To identify the best methodology, it was essential to proceed on this study by focusing on the above listed research questions. Finding comprehensive answers to these questions required a comparison between students who attend Montessori schools, students who attend schools that provide education for sustainable development and others who attend schools that provide global citizenship education. According to the current situation of education in Egypt, teachers and parents are not familiar with education for sustainable

development and global citizenship education concepts. Library based research became the most suitable method to collect the resources that are related to the subjects, which are needed to perform the analysis. This kind of research is needed as it focuses on the parts available in literature regarding a topic and compiling them together. The literature collected is then critically analyzed and the gaps between the different research works are identified. Some of the gaps can be bridged when the sources are compiled and analyzed, while others will remain uncovered. The identification of these remaining gaps helps in future research work. This research is based on literature review to determine the skills that are related to education for sustainable development, global citizenship education and Montessori education and their interrelationship.

To answer the research questions, some processes need to be followed. The processes consist of four stages; the criteria of inclusion and exclusion of the articles, development of search strategy, identification of relevant publication and critical analysis and exploration.

2.2 Criteria of inclusion and exclusion of the articles

Before searching the literature, the following inclusion criteria were formulated. First, each publication should be relevant, which means that the publication should be related to Montessori education, education for sustainable development and global citizenship education. The sources selected to discuss Montessori education were limited to the young age. The selected age range was between birth and six years old because, for Montessori, these years are considered the most formative and important years in developing the child physically and mentally. Also, the study included sources that

combine Montessori education, peace education and environmental education. These sources help in illustrating the connection between Montessori education, education for sustainable development and global citizenship education. In addition, documents related to education for sustainable development, Global citizenship education and the skills that these educations are providing for the student were selected. Second, each publication should be from a peer reviewed source. Third, publications selected were written in English because this is the language that the author can read and understand. Finally, the time span for the literature search was the following: The selected articles and research were related to Montessori education during the period from 1972 to 2010. This is the period when Montessori education started to blossom and schools in the United States started to implement this educational system. On the other hand, the selected articles related to ESD and GCED were sources published between 2002 and 2016 as it is considered a new educational call. Furthermore, the sources discussing Montessori education for the secondary period and other sources discussing the values of the method were excluded because this study is focusing on the young age and the skills that Montessori education, ESD and GCED are calling for.

2.3 Development of a search strategy

In order to develop a search strategy suitable for the main purpose of this review, some research terms were listed which are Montessori education, ESD, GCED, and the 21st century skills. Also, there are some keywords that were identified which are skills, peace education and sustainability. The chosen search strategy focused on title, abstract, and keywords in order to obtain publications with a clear focus on the subjects that are

necessary in this research.

2.4 Identification of relevant publications

Data was collected from a range of sources using the American University in Cairo (AUC) library online database that assists in accessing electronic journals like Journal of Research in International Education. Also, it allows the accessing of Database of Education Resources Information Center ERIC. Google scholar search engine was used to conduct more general search for articles and books in the areas of ESD, GCED and Montessori education. Books that were written by Montessori were selected to have a deeper understanding about her philosophy, principles, method of teaching and the role of the teacher in order to be able to comprehend what skills does the child gain and how. Most of the documents that are related to ESD and GCED are from the UNESCO as it is considered the main advocate for education for sustainable development and global citizenship education. To identify relevant publication, the abstracts of the selected articles were screened and if the abstract did not provide adequate information, the whole article was scanned to decide whether it is relevant to the study or not. The most relevant publications were selected.

2.5 Critical analysis and exploration

This stage requires a careful reading of the publications that were selected. The critical analysis for the publication was based on finding answers for the research questions, which provides the scope for evaluating the found publications. Starting with publication related to Montessori education and reading carefully through the publication, gives

insight to identify the skills that this education is providing the children with and recognize how do these skills are embedded in the children? After that, the publications related to Montessori education and ESD were explored to identify whether there is a connection between them and what are the skills that are common between both of them. Followed by publications related to GCED and peace education that support finding the answers of the research questions.

3 Theoretical Framework

The theory, which is guiding this study, is based on constructivism. This theory is based on the importance of the role of the teacher in helping the child to construct the knowledge as explained below. Constructivism is an epistemology; it is a theory that justifies the idea of how people learn and the nature of knowledge (Ültanır, 2012). Cobb and Bowers (1999) state that the knowledge is produced based on the people's beliefs and experiences (Schunk, 2012). The learning in the constructivism point of view occurs when individuals construct what they learn based on the interaction between their previous and new knowledge. Constructivism is a theory of knowledge; it focuses on knowing as a process (Ültanır, 2012). Construction of knowledge is an active process (Phillips, 1995) in which the learners actively create their knowledge then the truth appears (Schunk, 2012) this active engagement produces an understanding that could be transferred into different situations (Armstrong, 2011).

The mechanism of how the person learns or constructs the knowledge may differ (Phillips, 1995). Constructivism has three different perspectives. First, Exogenous

constructivism, this perspective is based on the external world in constructing the knowledge, it could be experiences, teaching and models. The Knowledge is a mirror of the external world obtained through social interaction. From this perspective, the reaction of the learner is adapted according to the situation. This perspective is influenced by Albert Bandura's social cognitive theory (Schunk, 2012). This perspective attempts to explain behavior, using the impressionistic models that is adapted by the learner and emphasized by the learning environment. The role of the teacher is important; the teacher should be highly knowledgeable and able to motivate the learners. In addition, the teacher should develop important cognitive abilities to the learners. The learning environment is modeling and explanation by the teacher (Armstrong, 2011).

The second perspective is Endogenous constructivism. In this perspective, knowledge is developed through cognitive actions (Schunk, 2012). It is an internal cognitive process in which new knowledge depends on earlier advanced mental structures. Internal cognitive is produced by experience in the environment. This perspective is shaped by Piaget's theory of cognitive development. Piaget believes that learning happens when a human encounters a contradicting situation in his environment and create a new schemata to handle unfamiliar situations (Armstrong, 2011). Piaget focused on the biological and psychological factors to be found in individual learners (Phillips, 1995). This perspective developed an active learning environment that the learners are motivated to assimilate and accommodate. The activities are ranging between exploring, experimenting and problem solving; the role of the teacher is to create an environment that is suitable for such activities (Armstrong, 2011). Also, the teacher encourages learners to question and challenge their own ideas (Ültanır, 2012). The role of the teacher is to be a facilitator and

to encourage the learners to become actively involved in the learning process through social interaction and using different materials (Schunk, 2012). Based on that, Geary (1995) mentioned that students become active learners and develop knowledge for themselves (Schunk, 2012).

The last perspective is Dialectical constructivism. This perspective lies between Endogenous constructivism and exogenous constructivism it also referred to Cognitive constructivism. This perspective believes that the knowledge arises when persons interact with the environments. Construction of knowledge happens when learners reflect the outcomes of mental contradiction with the environment. This perspective stresses on the social factors and it aligns with Bandura's social cognitive theory (Schunk, 2012) with a slight difference that simulations are considered outside the learner; pressing in on them (Armstrong, 2011). In addition, it supports Vygotsky theory as it stressed that the social factors are the reason of constructing knowledge (Phillips, 1995). Vygotsky's theory emphasized that the key to human development is the interaction of individual, cultural-historical and interpersonal factors. This interaction encourages developmental processes and fosters cognitive growth. However, interaction could not provide children with information, the children knowledge, characteristics and reorganize that their mental structures are shaping their experiences (Schunk, 2012). Vygotsky introduced the idea of consciousness, which is the interaction between social activity and internal processes. This concept is defined as the ability to understand in a meaningful way and to develop naturally with social interaction, as a result, higher mental processes are developed (Armstrong, 2011). Moreover, another contribution from Vygotsky was the zone of proximal development (ZPD). It is defined as "the distance between the actual

developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers” (Vygotsky, as cited in Schunk, 2012, p. 243). It is a test that shows the student’s development in a specific area and how learning and development are linked (Schunk, 2012).

Bruner mentioned that ZPD reflects the idea of collective activity, in which those who are more skilled and knowledgeable share their knowledge with the less skilled to accomplish a task (Schunk, 2012). The teacher role is a scaffold, in which the teacher prepares all the work then shares responsibility with the learners. After insuring that the learner becomes more knowledgeable about the subject of learning, the teacher then withdraws the scaffolding and the learners perform independently. Another role is reciprocal teaching, it is an interactive dialogue between the teacher and a group of students, the teacher models the activities then the students take turns (Schunk, 2012).

Constructivism stressed on the importance of the integrated curriculum in which students study a topic from multiple perspectives (Schunk, 2012). According to the explanation of the constructivism theory and the highlighted role of the teacher, the role of the teacher in Montessori education, ESD and GCED will be explained.

Maria Montessori believed that people are natural learners. If the learners are occupied in an environment rich with puzzles, they will learn unconsciously similar to Vygotsky theory (Duckworth, 2008). The role of the teacher in Montessori education is a facilitator and provides an encouraging atmosphere that is appropriate to the individual’s level of development (Montessori, 1972). Also, the role of the teacher in education for sustainable

development is a facilitator. The ideal teaching strategies are based on the encouragement of enquiry approaches such as investigation of different viewpoints, discussion, experiential and fieldwork activities (Corney & Reid, 2007). Moreover, the role of the teacher in global citizenship education is a facilitator, collaborator, program organizer, life long learner and must be global citizens themselves. Also, the teachers face and resolve global challenges. Students need to learn to do, to live and to learn (UNESCO, 2013). According to the above, the students construct the knowledge through active engagement and the role of the teacher is to encourage the learners to become actively involved in the learning process through exploring, experimenting, solving problem, interacting socially and exploring different materials.

4 Literature Review

4.1 Montessori education

4.1.1 Montessori's Philosophy

Montessori believed that the child starts to learn from birth; the first few years of life are the most formative and important years in developing the child physically and mentally. This period is called the sensory period, in which the child is particularly receptive to certain stimuli (Hainstock, 1997). During infancy and toddler ages, there are many wires and connections inside the brain that function and become connected only in this period. The brain becomes connected efficiently by being stimulated externally from the surroundings. The brain develops with the support of the surrounding external factors. Unconnected brain structures develop by the help of the five senses of vision, hearing,

smell, taste and touch. Encouraging the child to interact in various activities is essential for the three-year-old children, because the brain in this age is two times more active than an adult; this interaction will help in the brain development (Baxamusa, 2010). Maria Montessori developed an interactive curriculum that changed the traditional classroom model. It encourages students to move and interact in a structured environment that supports the children's natural curiosity (Ültanır, 2012). Montessori believed that the child is self-constructed; the child works with the target of growing as he develops some skills like concentration, work habit, motor development and self-concept. Montessori concluded that a child becomes self-constructed when he acquires a pre-determined pattern of mental development. She believed that for this pattern to appear, there are two conditions that must be satisfied. The first one is the environment; the child must interact with the environment around him to recognize the limit of his universe. The second condition is freedom; the child needs freedom to show himself. The aids for child's self-construction are internal aids like sensitive periods and external aids like environment and freedom. The sensitive periods are six periods that a child goes through the first period is sensitivity to order; from one to two years of age. The child needs order in the environment because he constructs himself from the elements of the environment. The child can make sense of the world based on the order that exist in the environment around him. The lack of this period will cause the child to have no confidence in himself. The second period is learning through their five senses; from zero to five years. The child needs objects in his environment, which he can see, hear and manipulate it with his hands, to foster his mind to develop his neurological structures for perceiving and thinking. Lack of this period, will lead to poor development in will and poor

concentration. The third period is sensitivity to small objects; between two and two and half years. This period is important for the child development as it expands the child's ability to observe and to allow the child to concentrate on a specific problem. The fourth period is sensitivity to coordination of movement; from two and half to four years. In this period the child brings the body under the control of the will, it is considered as a rebirth. The fifth period is sensitivity to language; from one and half to three years. If the child was not exposed to the sounds and language in this period, he will become less confident. The sixth period is sensitivity to social aspects; this period will affect the child's ability to communicate with others (Montessori, 1972).

According to Montessori, there are eight laws of development. One of them is the law of independence, the achievement of independence is important for the child to listen to his own inner guide. The child can be independent through some procedures. For the child to become independent, the teacher assists him to do the activities that he can perform on his own and not become a load on others. The teacher encourages the child to dress himself, wash himself, pick up fallen objects and express his needs in a suitable manner. So, the child will be able to satisfy his desire with his own effort. Also, the child should be assisted in developing discipline and the adult should set fixed limits against social actions. Another law is 'development of will', this occurs through activities related to the environment. The child decisions and the actions, which are taken through the activities, are the basis of the development of the will. The first stage in the will development is the repetition of the activities, this stage assists him in his mental development and helps him in gaining control over himself and the environment. After that, the child will move to the second stage, which is the self-discipline. In this stage, the child is responsible about his

decisions and actions. Then, the child reaches the last stage, which is the development of the will. The child enjoys turning his power of obedience to serving others. Another law is development of the child's imagination and creativity. The imagination is developed by experience with real things, reading real stories, being in touch with nature and freedom (Montessori, 1972). To sum up, Montessori's philosophy is based on prepared environment and materials that are specially designed and it includes education for the whole child "cognitive, emotional, moral, physical, social and spiritual" (Conesa, 2010, p. 264).

4.1.2 Principles of Montessori education

A well-established and organized environment is essential for children's learning. Based on this principle, a Montessori school should be designed in a way to develop the child's sensory sensitivity through the materials that are designed especially for the use of the children and the desks and tables that are suitable for the child size (Guttek, 2004).

The liberty of the child is essential to child development through this sensitive period. In this period the children are ready to learn particular activities. The self-correcting materials assist the child's development in this period based on Montessori's believe that these materials will develop self-discipline and confidence by letting the child become aware of his mistakes and work in the task until he masters it (Guttek, 2004).

The child's education should match with the child's own stage of development and Montessori identified three major stages of development. The first stage, which is from birth to six years of age, is called the absorbent mind. This period is divided into two

parts from birth to three years and from three years to six years. This period is called absorbent because the child absorbs information from the environment (Guttek, 2004).

4.1.3 Method of Teaching

Montessori has established an educational method to help in applying her philosophy. The first thing she emphasized on is the importance of a carefully prepared environment as an instrument to help the child to develop self-construction (Guttek, 2004). The main method that the teacher uses is based on observation. For the teacher to be able to observe, the children must be free and placed in an environment that they can manifest their natural personalities. In order to achieve this target, Montessori started by having child size school equipment that satisfied the child's desire of moving about intelligently. For example, chairs are manufactured for the body shape of the child and easy to be carried and the child uses the most convenient position that makes him feel comfortable. Montessori believed that the child has a means of correcting himself. When a child accidentally makes a chair fall down by his awkward movements, he has an obvious proof of his own incapability and he will correct his action and be conscious. Montessori claims that discipline is an inner attitude and it appear when an individual becomes the master of himself and when he achieves this level, he will control himself when he must follow a rule of life (Montessori, 1972). This process is based on self-direction (Ültanır, 2012). One of the methods implemented by Montessori education is using sensorial materials. These materials help the child to separate a specific feature of something and make him/her understand the feature and form a clear perception about it. These materials help the child to concentrate his mind on one specific quality (Larson, 2010).

Moreover, Montessori's methods foster imagination for the learners through allowing the child to explore his interest and passion. As a habit of critical thinking and independence, a peaceful world will exist because it will provide a manner of protection (Boulding as cited in Duckworth, 2008, p. 35). Her methodology focused on the development of the whole child in which it develops the child's will, attention, imagination and intelligence. Also, Montessori methodology valued the creativity of the student and the critical thinking skills (Duckworth, 2008).

4.1.4 The Role of the Teacher

The teacher, who accompanies the child, has to be well trained and have the knowledge that every child has a passion for a particular learning content (Ültanır, 2012). The teacher prepares the materials according to the child's readiness (Gutek, 2004). For example, if the purpose of the activity is to develop coordination of movement and visual and tactile perception of dimensions, the materials that the teacher will prepare are building blocks of gradated size. The teacher role in this activity is selecting the largest cube and place it in front of the child and continue in this manner until all blocks have been built up in tower. After that, she counts the number of the blocks and names the colors. Finally, blow the blocks from the tower explaining that light ones fall, while the heavy ones remain in place. Control of error is if the tower is not correctly built, it will collapse and if the blocks are not placed in order of size, the blocks will not fit correctly (Hainstock, 1997). The teacher is a facilitator; her duty is explaining the use of the materials, as the teacher is the main connection between the materials and the child. Also, the teacher should become familiar with the materials and place the children in contact with the order that exists in their environment. When the child uses a specific material to

work with, he cannot give up the work because he reached his desire, but he must complete the work till the end and then return it back in the same condition that it was at before. This is because he respects the roles and the environment that he is in (Montessori, 1972). The materials that are used in Montessori education are attractive; in order to catch the children's attention and make them desire to play with them. The teacher plans the activities in a way that the objects are portable, used easily and used well. The materials are designed in a way that controls errors that are obvious to the children and allow them to correct themselves. The aim of the materials is helping the children to create mental order (Guerra and Zuccoli, 2012). When a child works independently with the self-correction material, he/she will develop a certain understanding of the absolute nature of reality. The material will help the child to act in a certain way because things have a specific nature. As a result, the child will grasp that the world has a certain order and for the child to be successful, he/she has to think critically. He/she has to understand the reality of things, their reaction and its relation to other things (Larson, 2010).

The characteristic of the carefully designed materials, make the possibility for exploration depend on isolating the senses for the different properties of the different objects presented to the children in a specific order. For example, the objects are attractive, the activity is well planned, the objects are easy to use and error controlled. (Guerra and Zuccoli, 2012). The teacher provides an encouraging atmosphere that is appropriate to the individual's level of development. An essential feature of Montessori pedagogy is independent work as the child chooses the activity that he wants to work in, with whom he likes to play and the time he would like to spend in the activity. Also,

encouraging creativity, problem solving skills, independence and self-control (Ültanır, 2012). A study was conducted to evaluate the social and academic impact in Montessori education. A comparison was between a control group and a Montessori education group. A group of five-year-old children attended Montessori education were tested for cognitive/academic and social/behavioral skills. The results showed that there are significant difference favoring Montessori education in skills related to school readiness in the following: applied problems, letter word identification and phonological decoding ability. Also, the children were tested on social and behavioral skills. Children were given stories about social problems and they were asked how they would solve the problems. Children who attend Montessori education showed high level of reasoning. Moreover, observations of the children in the playground during recess showed Montessori children were positively sharing peer play and less involved in rough play (Lillard & Quest, 2006).

Additionally, a study by Bahatheg (2010) examined the effect of Montessori materials in developing children's creative problem solving skills. The methodology was based on a quasi-experimental design combined with a sample of qualitative case. The research was conducted in one pre-school in Riyadh, Saudi Arabia. The sample contained 24 five-year-old children. The children used the Montessori sensory materials for one academic year. The results from this study reveal significant differences between the control and the experimental groups. The children who were exposed to Montessori sensory materials had significant improvement in their capability to solve problems. While, individual differences were identified through their different ways of framing and solving their own problems through exploring different positions of the materials and using them in creative solutions (Bahatheg, 2010).

Moreover, a study by Gomes (2005) explores whether a creativity-focused science curriculum for pre-school could increase creativity and problem solving in children. The researcher adopted Montessori's philosophy of education, which is that the children construct their knowledge by interacting with the environment, the materials and others in the environment. The researcher used an action research methods based on observation of two groups. One group used the creative focused science curriculum, while the other group used the existing curriculum. The results show an increase in creativity and problem solving in the focused group (Gomes, 2005 as cited in Bahatheg, 2010).

Furthermore, a study by Besancon and Lubart (2008) investigated the development of creativity of children in diverse learning environments in Paris. Three schools were chosen; one is a French school with a French pedagogy, Montessori school and traditional school. The study was conducted over two years. The researcher used three divergent thinking tasks. The results showed that the children in the Montessori school were associated with overall increase in creative abilities. Also, the study revealed the effectiveness of the Montessori method in developing creativity in children (Lubrat, 2008, as cited in Bahatheg, 2010).

To sum up, this part introduced Montessori education and covered the philosophy, principles, method of teaching, the role of the teacher and how Montessori education provides the children with these skills. The concept of Montessori education in this study is the education that allows the child to explore and become independent. Also, this education provides the child with skills that are needed for the future. These skills are critical thinking, problem solving, self-control, independence and creativity. The methods used help in fostering imagination because imagination is developed through lots of

experience with real things, freedom, communication with nature and playing with real objects. After defining the concept of Montessori education, the following part will discuss Montessori education and education for sustainable development.

4.2 Education for sustainable development

In order to be able to answer the research question: Does Montessori education provides people with the knowledge and skills that are needed to save the environment? This part will explore whether there is a connection between Montessori education and education for sustainable development. Moreover, environmental education and education for sustainable development need to be discussed, in order to highlight the emergence of Montessori education and the effect of the environment on the children's life. Also, this part will help in understanding how environmental education transformed to education for sustainable development. After that, identifying the concept of education for sustainable development will be introduced and the skills that this education is seeking will be focused on. In order to understand the importance of education for sustainable development internationally, Expectations of the Decade of Education for Sustainable Development (DESD), 2005- 2014 and the New Sustainable Development Agenda (2015 – 2030) will be discussed and the role of education will be highlighted in order to understand the status of education internationally and the importance of initiating education for sustainable development in the education system.

4.2.1 Environmental education and education for sustainable development

Changing of the global environment is devastating the Earth system for supporting life and that will be considered as a threat to the world living species. Moreover, the planet's capacity to sustain future progress is in serious doubts. According to that, environmental education is important for the young children. The role of the society is to equip children with skills, attitudes, values and knowledge that are essential for supporting the students to rethink and change their current actions to ensure sustainable future for all. Environmental education requires all the stakeholders to work together to solve problems and issues related to the environment (Davis, 1998). In the mid 1960s, environmental education evolved. It was influenced by the thinkers of the eighteenth and nineteenth century, particularly "Goethe, Rousseau, Humboldt, Haeckel, Froebel, Dewey and Montessori" (Palmer, 1998, p.4). Montessori was one of the thinkers who appreciated the idea that learning and development of children is enhanced throughout interacting with nature. This interaction provides a strong basis for building sustainable connection between people and nature (Davis, 1998). The International Union for the Conservation of Nature and Natural Resources (IUCN) in 1970 defined the environmental education as the following:

"Environmental education is the process of recognising values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Environmental education also entails practice in decision-making and self-formulation of a code of behaviour

about issues concerning environmental quality” (IUCN, as cited in Palmer, 1998, p.7).

In 1975, the United Nations Environment Programme (UNEP) was established and with collaboration with UNESCO, they founded the UNESCO/UNEP International Environmental Education Programme (IIEP). IIEP established the first inter governmental declaration on environmental education. It illustrates the aims, objectives and guiding principles of environmental education, which are briefly the following: to promote understanding of economic, social, political, and ecological interdependence in the country, to provide people with knowledge, skills, values and commitment that are needed to save the environment and to change the behavior of individuals and society towards the environment. Two decades later, in 1992, at Rio de Janeiro, in the United Nations Conference on Environment and Development, there was a major action for how to inform people about what should they do to achieve sustainable development in the 21st century (Palmer, 1998). Since Earth Summit in 1992 in Rio de Janeiro, the critical role of education has been recognized in promoting sustainable production and consumption in order to change human attitudes (UN Decade of Education for Sustainable Development, 2016). The Johannesburg World Summit on Sustainable Development views sustainable development as being concerned with environmental aspects, social and economic areas (Report of the World Summit on Sustainable Development, 2002). In United Nations Conference on Sustainable Development, Rio+20, in 2012, the importance of promoting education for sustainable development and integrating sustainable development actively into education was also emphasized (Sustainable development knowledge platform, 2015).

4.2.2 Education for sustainable development

The concept of Education for Sustainable Development ESD is: the will to improve everyone's quality of life by reconciling economic growth, social development and environmental protection (UN Decade of Education for Sustainable Development, 2016). As mentioned in UNESCO (2016), Education for Sustainable Development (ESD) allows people to obtain the knowledge, skills, attitudes and values essential to shape a sustainable future (UNESCO, 2016). The definition of sustainable development as mentioned by Ramzy and Wahieb (2012) is that sustainable development should fulfill the needs of present generations without threatening the ability of future generations to meet their own development needs. Sustainable development captures several dimensions, which are divided into three main pillars; Environmental, Economic and Social sustainability (Ramzy and Wahieb, 2012). At the Earth Summit in Rio de Janeiro, the major social, economic and environmental issues that intimidate the sustainability of the planet were identified. Any program that is related to education for sustainable development should address these issues. The social and economic dimensions are the following: protecting and promoting human health, poverty reduction, sustainable consumption and making decisions for sustainable development. While, the environmental issues are climate change, combating deforestation and desertification, protecting oceans, protecting and managing clean water. In addition to, strengthening the role of the major groups like women, farmers and indigenous people. The communities that introduce ESD should select few issues from social, economic and environmental issues that are relevant to them. For example, a land locked country cannot study the topic of protecting the ocean (McKewon, Hopkins, Rizzi & Chrystalbride, 2002). Based

on that, to introduce ESD in any curriculum, the curriculum designer must make several decisions. Starting with selecting the suitable topics according to the future assumptions. Moving to the knowledge of what skills, values and perspectives are needed. The topics should be relevant and understandable according to the audience ability. For example, if the target audience is young children, the subject that needs to be introduced should be suitable to their age. Therefore, global issues that the children cannot control are not appropriate to be introduced (Hopkins & McKeown, 2002). According to these major issues, ESD demands methods that encourage and empower learners to take actions for sustainable development and change their performances (UNESCO, 2016).

The role of educators in sustainable development was introduced by an expert group from United Nations Economic Commission for Europe UNECE (2011). They identified key competences that educators need to be involved in sustainable issues, which are the following: integrative thinking, envisioning change and achieving transformation regarding sustainable educational system and future. Accordingly, an educator needs to become a facilitator of learning not a transmitter of knowledge (UNECE, 2011). Moreover, the philosophy of education for sustainable development is based on student-centered pedagogy. As a result, educational practices needed to be directed towards solution oriented and participatory methods that would facilitate the development of creative, critical and systematic thinking. Furthermore, some skills are essential in order to behave in a sustainable manner; these skills are the following: Communication, teamwork, asking critical questions, thinking about issue in the long term and thinking in a holistic manner and being able to take action (UNECE Strategy for Education for Sustainable Development, 2005). Additionally, Dale and Newman (2005) state that ESD

skills are collaboration and cooperation, conflict resolution, creativity, imagination, and real-world problem solving, interdisciplinary and trans disciplinary research skills, adaptive learning, contextualization of issues and systems thinking (Armstrong, 2011). Although the literature on specific pedagogy for education for sustainable development is limited, the ideal teaching strategies comprise the encouragement of enquiry approaches including investigation of different viewpoints, discussion, experiential and field work activities (Corney & Reid, 2007), collaborative activities, systems instruction and reflection, modeling thought processes, offering multiple perspectives on topics, back casting, and scenario building, problem-based assignments, inquiry and action research (Armstrong, 2011). These approaches should support students to develop and express their own views (Corney & Reid, 2007). Also, It encourages capabilities like critical thinking and making decisions (UNESCO, 2016). To apply education for sustainable development, there are pedagogical strategies that are divided into the following. First pedagogical strategy is reframing knowledge. According to the literature, two streamed ways have emerged which are, creating a lens of citizenship and stewardship in which all course topics are perceived or infusing sustainable development throughout the curriculum. Second strategy is developing skills and values that support sustainability and modeling to reality. The success of the implementation of ESD is relying on the commitment of the educators to the new paradigm. Finally, the way of assessment is the tool that keeps ESD a significant area of opportunity (Armstrong, 2011).

The expectation throughout the Decade of Education for Sustainable Development (DESD), 2005- 2014 was that the education for sustainable development would provide citizens with skills that enable them to face the challenges of the present and future. Also,

another expectation is to be respectful to the earth and promote democracy in the society (UN Decade of Education for Sustainable Development, 2016). The decade would focus on improving the quality of education. It will start with basic education by focusing on skills, values and sharing knowledge that encourage sustainable livelihoods, revising education from nursery school through university and build public understanding and awareness and providing practical training to all sectors to apply in the workforce with the knowledge and skills necessary to make decisions in a sustainable manner (UN Decade of Education for Sustainable Development, 2016). In 2015, the world leaders gathered in the United Nations to adopt the 2030 Agenda for Sustainable development Goals (SDGs) that guides policy and funding (United Nation Development Programme, 2016). The idea of the SDGs was first introduced in 2012 at the United Nations Conference on Sustainable Development, Rio+20. These goals were built on and replaced the Millennium Development Goals MDGs (United Nations Development Programme, 2016). The Millennium Development Goals were adopted in 2000 and their targets were reducing poverty, hunger, disease, gender, inequality and access to water and sanitation, while the new SDGs are tackling the sources causing poverty and the development that is suitable for all people (United Nations Development Programme, 2016). Johannesburg Plan of Implementation (JPOI) tackled the necessity of integrating sustainable development into formal education at all levels, as well as through informal and non-formal education opportunities. Education has a key role in shaping values that are encouraging sustainable development (Sustainable development knowledge platform, 2015).

4.2.3 Montessori and Environmental Education

Montessori discovered that the child has absorbent mind. He has a creative intelligence that exists in his unconscious mental stage. He would absorb skills and abilities through activities. Also, Montessori discovered that the child shape his personality throughout his connection with the environment. Moreover, the child passes through periods in which the child has special creative sensitivities; one of these periods is called the sensitive periods. She observed that these periods in the child's life are linked with the need for order in the environment (Montessori, 1972). The Montessori's philosophy and educational methods have common characteristics with environmental education. For example, the children are encouraged to respect the environment and develop values for peace. Montessori method of education recognizes that everything is connected on this planet and it is important to study ecology. From Montessori perspective ecology is important because it develops awareness of the human impacts on the Earth and encourages values of caring about the environment. According to that, environmental education and value education are vital components in Montessori education (Lewis, Mansfield & Boudains, 2008). Education for sustainability from Montessori perspective is developing concern about human actions towards our planet and creating a value system that will make children have commitment towards the environment (Lewis & Boudoins, 2007). Education for sustainability provides the learners with skills that support them to take positive actions towards environmental problems and to have critical understanding of how complex systems like ecosystem and sociopolitical systems work. These understandings have been developed in the Montessori education context. An important component in the curriculum is the role of nature in education (Lewis &

Boudoins, 2007). Education for sustainable development needs the whole system thinking approach, which means to see the whole picture by emphasizing on the relationships between all systems in the planet. Accordingly, a study was conducted to examine the application of the whole system approach on education for sustainability at Montessori primary school. In Montessori education, the role of nature and interdependence of all life is an important component of the curriculum. For example, according to Montessori education, one of the environmental projects is about science by the lake in which the student tested the quality of the lake, studied the macro invertebrates and the lake ecosystem. However in the education for sustainability context, this project is about students take a positive action to improve the environment like removing the unusual weeds on the edge of the lake and observe any environmental change as a result of their actions. The findings from the study show that the Montessori philosophy has facilitated the adoption of EfS (Lewis & Boudains, 2007).

4.3 Global citizenship education

This part will discuss the connection between Montessori education and Global citizenship education. To understand this connection, global citizenship and global citizenship education need to be defined. After that, the goals and the core conceptual dimensions of global citizenship education are introduced in order to clarify the meaning of global citizenship education. Finally, in order to understand the connection between Montessori education and Global citizenship education, peace education is highlighted.

4.3.1 Global Citizenship Education

In 2012, UN Secretary- General launched the first initiative of global citizenship education as a third priority (UNESCO, 2013). The first step in defining global citizenship education is to define the meaning of global citizenship, the second step is to elaborate on the meaning of global citizenship education.

There is an argument about the definition of global citizenship. According to UNESCO (2013), some have called it the “ ‘citizenship beyond borders’, or ‘citizenship beyond the nation-state’”. Others have noted a broader definition, which is ‘cosmopolitanism’, while others chose “planetary citizenship” focusing on the community’s responsibility towards the earth (UNESCO, 2013). However, global citizenship refers to “the belonging to the global community and common humanity, with its presumed members experiencing solidarity and collective identity among themselves and collective responsibility at the global level. Global citizenship can be seen as an ethos/metaphor rather than a formal membership” (UNESCO, 2013, p. 2). In the psychosocial framework, global citizenship can help in promoting a better world and future by engaging its members in civic actions (UNESCO, 2013). Applying the Global citizenship requires some approaches. The UNESCO’s approaches toward GCED are the following: A holistic approach that could be formal and informal, curricular and extra curricular interventions and conventional and unconventional pathways. The formal setting can be introduced as a part of a subject or an independent subject. As informal approach, it could be through the use of information and technology, social media, sports competitions and the use of arts and music. The second approach is a transformative approach that allows the learners to transform themselves and the society. Finally, the existence of a universal values and the

encouragement of youth led initiatives (UNESCO, 2014). These approaches depend on the understanding of the importance of the membership of the global community as it is considered a moral aspect (Parker, Wade and Atkinson, 2004). The community member has duties and rights and it draws upon ethical believes of universal faith communities. Global citizenship discourses highlighted global human rights and secures these rights with actions (Parker, Wade and Atkinson, 2004).

Education for global citizenship “means embracing a more holistic view of what kind of skills and attitudes are needed in our world today. While skills for jobs are important, so are skills for living together” (UNICEF, 2013, p.26).

The purpose of this part is to clarify the meaning of global citizenship education through understanding its goals and its core conceptual dimensions.

4.3.2 Goals of global citizenship education

The aim of global citizenship education is to enable students to participate and have active roles locally and globally. Also, it supports the learners with skills that help them to face and solve global challenges and become active contributors in the sustainable world. Moreover, global citizenship education provides students with the capability to understand their rights and responsibilities to promote a better future (UNESCO, 2013). Furthermore, it enables the learners to deepen their understanding about global governance structures and the connection between global, national and local systems and also, respect diversity and multiple identities (UNESCO, 2015).

4.3.3 Core conceptual dimensions of global citizenship education

Global citizenship education provides the learners with the capability of gaining knowledge about specific global issues and appreciating key general values like human rights, diversity and democracy.

The core conceptual dimensions can be divided into the following: Cognitive, socio-emotional and behavioral, which are explained below:

“Cognitive: To acquire knowledge, understanding and critical thinking about global, regional, national and local issues and the interconnectedness and interdependency of different countries and populations.

Socio-emotional: To have a sense of belonging to a common humanity, sharing values and responsibilities, empathy, solidarity and respect for differences and diversity.

Behavioral: To act effectively and responsibly at local, national and global levels for a more peaceful and sustainable world” (UNESCO, 2015, p.15).

The concept of global citizenship education in this study is the education that provides the students with cognitive skills that help them to be creative, innovative, problem solvers and decision makers, and non-cognitive skills like openness to experiences and interacting with people of different origins and backgrounds. Also, it encourages the learners to engage in proactive actions (UNESCO, 2013).

4.3.4 Education for peace

Montessori argued that education was a method of eliminating war, as she believed that this elimination would happen through spiritual and moral education (Duckworth, 2008). In the post Second World War era, peace education started to appear with an aim of helping students to accept others from different nations and to develop international understanding. After that, this education focused on broader ideas that include ways that help in making connections between societies and improving the relationship between the person and the environment (Palmer, 1998). Montessori highlighted the importance of education for peace in three different occasions. In 1932, it was addressed to the Geneva Convention, in 1937 at the International Congress and in 1947 at the end of World War II. She deduced her belief that education can make the children become “*armaments* for peace” (Wolf, as cited in Conesa, 2010, p. 270). Cunningham (2007) stated that The International Institute of Education was created in 1945 during the first meeting of the United Nations Educational, Scientific, and Cultural Organization (UNESCO), in which Montessori was a participant, ‘to promote peace through education’ (Conesa, 2010).

Duckworth (2006) states that Montessori schools provide the children with the ability to become confident and independent. According to Paulo Friere theory, confidence and independence are significant for helping children to think critically and perform with moral courage to work for social change. Montessori’s method encourages children to explore and question, which are important to achieve peace education as Friere writes “In problem posing education, people develop their power to perceive critically the way they exist in the world with which and in which they find themselves” (Friere as cited in Duckworth, 2006, p. 40). Moreover, Boulding states that fostering imagination in

children at Montessori school is important in peace education. Social imagination can be understood as an ability of problem solving (Duckworth, 2006).

Montessori's methods help in an indirect way in reinforcing teaching global citizenship education through living out the values by fostering critical and independent thoughts that provide a manner of awareness and developing imagination by allowing children to go for their curiosity that contribute in solving the common problems. In addition, Montessori's methods emphasize on self-discipline through involving the students in forming community rules and if undesired behavior occurs, the reaction should honor the humanity of both sides (Duckworth, 2008). Montessori argued that values such as personal responsibility, respect for diversity and global citizenship should be part of every child's education directly and indirectly and it is as crucial as the other subjects. In *Education and Peace*, she explained "Peace is a goal that can only be attained through common accord, and the means to achieve this unity for peace are twofold: first, an immediate effort to resolve conflicts without recourse to violence—in other words, to prevent war—and second, a long-term effort to establish a lasting peace among men" (Montessori, as cited in Duckworth, 2008, p. 34).

Moreover, Montessori education is considered as a leader in advocating for global citizenship education using scientific pedagogy based on the observation of children's development. Furthermore, this education held the key to encourage children's understanding and appreciation for different cultures and causing a worldview that encourages understanding and working with people from different cultures and countries (Conesa, 2010).

Conesa (2010) discussed how Montessori education tackles the promotion of global citizenship education through peace education. That happened within the idea of integrating history and geography curricula that stresses on nationalism and supports a global citizenship perspective. Based on their history and geography work, the children understand that any person in the whole world had and have the same basic needs. Also, they understand how different groups of people meet their needs. Throughout this work “Montessori has presented a frame- work for preparing children... for their work within a larger community – the whole human family” (Scott, as cited in Conesa, 2010, p. 265).

After highlighting the connection between Montessori education, global citizenship education and education for sustainable development, section 4.4 will focus on the skills that are provided by these education systems.

4.4 21st century skills

The 21st century skills are the skills that are needed for the students to compete in the work field. Due to the change in the economy, technology and job types, there has been a shift in the essential skills that are needed for the work field. They moved from manufacturing skills to information and knowledge skills. Education is considered the main tool that provides people with the skills that help them in meeting these challenges (Pacific policy research center, 2010). The 21st century skills are divided into learning skills and career skills. The learning skills are defined as the ability of communication, collaboration, critical thinking, problem solving, creativity and innovation. The career skills are defined as the ability of the individuals to work effectively with different team, social and cross culture skills. The methods that facilitate providing the students with

these skills are the following: project-based learning, problem-based learning, and design-based learning (Pacific policy research center, 2010). Unfortunately, these skills are not recognized by traditional educational assessments that are based on memorization. While, 21st century skills are important in improving economic competitiveness. They are also important for more social domains as the growing level of immigration, these skills help in the acceptance of each other (Wright and Lee, 2014). Schools should transform in ways that support students to obtain these skills. These skills are needed for the students to be successful in their work and life. The digital age requirements for the employment are having the 21st century skills (Pacific policy research center, 2010). In addition, Binkley, Erstad, Herman, Raizen, Ripley, Miller-Ricci and Rumble, (2012) divided the skills into four groups. The first group is ways of thinking, which are divided into creativity, innovation, critical thinking, problem solving, decision-making, learning to learn and metacognition. The second group is ways of working that are divided into communication and collaboration. The third group is tools of working, which are information and communication technologies (ICT) literacy. The final group is living in the world; the needed skills are local and global citizenship skills, personal and social responsibilities (Binkley, Erstad, Herman, Raizen, Ripley, Miller-Ricci and Rumble, 2012). The definition of 21st century skills according to The Educational Testing Service (ETS), is the ability to “ Collect and/or retrieve information, organize and manage information, evaluate the quality, relevance, and usefulness of information, and generate accurate information through the use of existing resources” (As cited in Pacific policy research center, 2010, p. 2).

The 21st century skills include the skills that this study is looking for, which are critical thinking, problem solving, global and local citizenship, decision making and personal and local responsibilities. These skills are the skills that this study is investigating and which Montessori education is providing the children with and education for sustainable development and global citizenship education are calling for. Figure 1 illustrates the 21st century skills framework as summarized by Griffin and Care (2015).

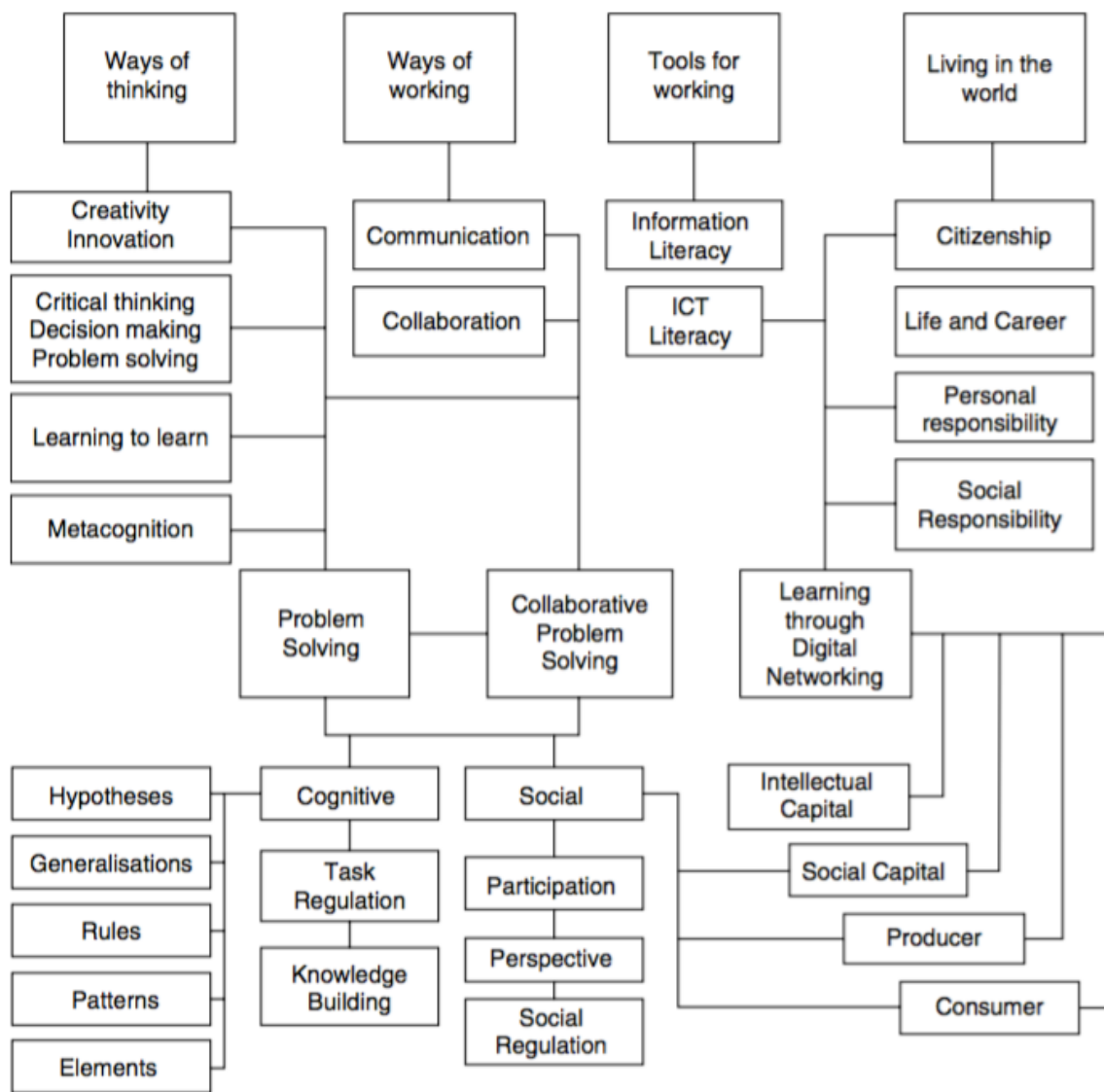


Figure 1: 21st century skills framework (Griffin and Care, 2015, p. 11)

5 Discussion

This research is exploring the ability of Montessori education to provide the children with the skills that both education for sustainable development and global citizenship education are calling for. To find out the answer for the three questions that are addressed which are to what extent does Montessori education, which became popular in Egypt recently, help in providing the young age children with skills that education for sustainable development is calling for? Does Montessori education have the potential to change the behavior of individuals and societies and provide them with skills that global citizenship education is calling for? And To what extend do the skills that this research investigate related to 21st century skills?

To find out the answers, some concepts needed to be identified which are Montessori education, ESD, GCED and 21st century skills. The research was divided into three parts the first one is to address the first question which is to what extent does Montessori education, which became popular in Egypt recently, help in providing the young age children with skills that education for sustainable development is calling for? And the second part is to find an answer to the second research question. Followed by the third part to answer the final research part.

5.1 Montessori education and education for sustainable development

Firstly, in Montessori education, the skills that the child gets are independence, problem solving, creativity and imagination. In order to understand how the children get these skills, there are some points that need to be highlighted, which are the philosophy, the

method of teaching and the role of the teacher. The philosophy that Montessori applies has a very important role in providing children with these skills. Montessori believes that the first few years of the child life shapes the kind of the man that the child will become. The child goes through some periods called the sensitive periods that are important to develop the child mentally and physically. Also, Montessori believed that the child is a self-construction in which he constructs the knowledge through two aids; an internal aid, which is sensory period and external aid, which is through freedom or interacting with the environment. There is a case study in which the researcher adopted the Montessori philosophy to explore whether a creativity-focused science curriculum for pre-school could increase creativity and problem solving in children and the results show an increase in creativity and problem solving in the focused group (Bahatheg, 2010). As a result, the philosophy is considered as an important feature to provide the children with skills. Another important aspect in Montessori education is the method of education. Montessori education uses special materials that are self-correcting materials. These materials support the child's development during the sensory period according to Montessori's believes that these materials develop self-discipline and confidence by allowing the child to become aware of his mistakes and work on the task until he masters it. As a result, these materials are essential in developing the children skills. Accordingly, there is a case study that examines the effect of Montessori materials in developing children's creative problem solving skills. The children used the Montessori sensory materials for one academic year. The children who were exposed to Montessori sensory materials had significant improvement in their capacity to solve problems. While, individual differences were identified through their different ways of framing and solving their own

problems through exploring different positions of the materials and using them in creative solutions (Bahatheg, 2010). Moreover, Montessori education encourages the children's independence through working with the self-correcting materials. These materials provide the child with the ability to grasp that the world has a certain order and by thinking critically, he/she will be successful. He/she needs to recognize the reality of things, their reaction and its relation to other things. Based on what was mentioned above, the skills that Montessori education is equipping the children with are independence, problem solving, creativity, self-discipline and imagination. After that, the researcher explored if there is a connection between Montessori education and education for sustainable development in order to understand the ability of Montessori education to provide the skills that sustainable development is calling for. Montessori was one of the thinkers who appreciated the idea that learning and development of children is enhanced through interacting with nature. This interaction provides a strong basis for building sustainable connection between people and nature (Davis, 1998). One of the principles of Montessori is a well-established environment that helps the children to build their characters according to their connection with nature. So she was one of the first to call for environmental education. When comparing between the definitions of the environmental education that Montessori is calling for and ESD, both are calling for equipping the student with skills, values and attitudes that are necessary to respect and save the environment and to be able to make decisions towards saving the environment. In addition, ESD is calling for economic growth and social development, however, this research is concerned about the skills. After understanding the definition, to apply ESD in any community, it should tackle issues that are related to the target community and

provide skills that this community needs according to the age of the students. Moreover, there are skills that are essential in order to help the student to behave in a sustainable manner. These skills are Communication, teamwork, asking critical questions, thinking about issues in the long term and thinking in a holistic manner and being able to take action. Additionally, Dale and Newman stated that ESD skills are collaboration and cooperation, conflict resolution, creative, imaginative, and real-world problem solving, interdisciplinary and trans-disciplinary research skills, adaptive learning, contextualization of issues and systems thinking (Armstrong, 2011). Although the literature on specific pedagogy for education for sustainable development is limited, the ideal teaching strategies comprise the encouragement of enquiry approaches including investigation of different viewpoints, discussion, experiential and field work activities (Corney & Reid, 2007), collaborative activities, systems instruction and reflection, modeling thought processes, offering multiple perspectives on topics, back casting, and scenario building, problem-based assignments, inquiry and action research (Armstrong, 2011). Furthermore, one of the pedagogical strategies to apply ESD is developing skills and values that support sustainability and modeling to reality. Moreover, there is a study by Lewis and Boudains about introducing ESD in a Montessori school that was conducted to examine the application of whole system approach on education for sustainability at Montessori primary school. The finding from the study shows that the Montessori philosophy has facilitated the adoption of education for sustainability.

Returning to Montessori skills which are independence, problem solving, creativity, self-discipline and imagination and based on that there is no specific pedagogy for applying ESD, Montessori education could be a facilitator program that embeds the children with

skills that are considered as part of the skills that ESD is needed. Based on the findings from the study, which introducing ESD in Montessori schools, Montessori education could provide the students with some skills that ESD is looking for.

5.2 Montessori education and Global citizenship education

The second part is addressing the second research question; is Montessori education able to provide the children with skills that foster global citizenship education?

Throughout the literature review, it was explained that global citizenship education aims are to give the learners the power to have active involvement in facing and resolving the challenges that face the world and to contribute proactively in achieving more peace, tolerance, inclusion, and security in the world. Montessori was one of the pioneers for calling for peace education and she tackled the importance of moral education. As mentioned earlier, Montessori education provides the child with confidence and independence. In Paulo Friere's Theory, for the children to think critically, they need to have confidence and become independent. With these skills, the child performs with moral courage and works for social changes. Moreover, Montessori's method encourages global citizenship in an indirect way through living out the values by developing the critical and independence skills that provide a manner of awareness. Global citizenship education required several approaches to be implemented one of the approaches is a holistic one that could be formal or informal. The formal way could be introduced as a part of a subject or an independent subject. Montessori education tackles the promotion of global citizenship education through peace education. That happened within the idea of integrating history and geography curricula that stressed on nationalism and supported

a global citizenship perspective. Based on their history and geography work, the children understood that any person in the whole world had and has the same basic needs. Also, they understood how different groups of people meet their needs. To sum up, Montessori education provides the children with confidence and independence that encourage them to perform with moral courage.

5.3 The 21st century skills and Montessori education

The 21st century skills include critical thinking, problem solving, global and local citizenship, decision making and personal and local responsibilities. These skills are related to Montessori Education. Looking at the skills that Montessori education develops at the early age, it can be seen that critical thinking is one of them. The child through the exposure to new materials and trying to learn how to use them develop critical thinking skills. Problem solving skills are also achieved when the child tries to use the materials within the Montessori method. Global and local citizenship, as discussed earlier in the global citizenship education system, is related to Montessori education. Decision making is a cornerstone of the Montessori method because, as presented earlier, the child is left to do his own things and this helps in developing the decision making skills in deciding what, how and when to do things. Having personal and local responsibilities is the tying point between 21st century skills, ESD and Montessori. A child who learns to take care of the environment and think in a sustainable manner, will have personal and local responsibility. To sum, the 21st century skills are part of the Montessori education, ESD and GCED.

6 Conclusion

This research explores the ability of the Montessori education to provide the children with skills that both education for sustainable development and global citizenship education are calling for. In order to explore this ability, three research questions were introduced which are the following: to what extent does Montessori education, which became popular in Egypt recently, help in providing the young age children with skills that education for sustainable development is calling for? Does Montessori education have the potential to change the behavior of individuals and societies and provide them with skills that global citizenship education is calling for? And To what extend do the skills that this research investigate related to 21st century skills?

Montessori education is capable of providing the young children with skills that facilitate the adaption of education for sustainable development. These skills are independent, problem solving, critical thinking and imagination. This is based on a case study that illustrates the skills that Montessori education embed the children with are part of the skills that education for sustainable development are calling for. Furthermore, the definition of global citizenship education was provided to explore the connection between this education and peace education that Montessori was calling for. This finding demonstrates the ability of Montessori education to assist in changing the behavior of individuals and societies and to provide them with skills that global citizenship education is calling for through embedding the children with the skills of critical thinking, independency and confidence that help in fostering the ability of the children to preform with moral courage. Moreover, this study was investigating whether the 21st century

skills are the skills that Montessori education, education for sustainable development and global citizenship education are providing the students with and the finding illustrates that some of these skills are related to the 21st century skills. These skills are critical thinking, problem solving, global and local citizenship, decision making and personal and local responsibilities.

7 Limitations and recommendations for future research

The limitation of this research is the limitation of the publications that are related to Montessori education, education for sustainable development and global citizenship education that are related to Egypt. Montessori education became popular recently in Egypt and according to Google there are two Montessori certified places in Egypt that offer certified courses in Montessori education and there is limited information about nurseries that are based completely on Montessori education.

My recommendation according to the findings of this research, that the government can provide Montessori education as a professional development course for teachers to help them to understand the importance of the role of the teacher and the importance of this education in providing the children with skills that will help them in the future. In addition, implementing Montessori education at national private schools in order to provide the students with skills that will foster the ability of introducing ESD education when it is available in Egypt and encourage GCED when needed. It is also recommended that the Montessori method be applied in a pilot scale first to validate its effect on the children.

In order to find comprehensive answers to the research questions, a recommendation for future research is to collect reasonable data. This requires a comparison between students who attend Montessori schools, students who attend schools that provide education for sustainable development and others who attend schools that provide global citizenship education. This comparison will require a mixed method research that will be conducted by contacting a place that provides Montessori education course and a nursery. Surveys and questionnaires can be addressed to the teachers and the parents asking about if they notice any changes on the child after attending the Montessori nursery and whether, for the people who attended the course, they found any change in their way of thinking. Also, data can be collected by observation of the children at the nursery and then analyzing it.

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