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The American University in Cairo

School of Graduate Studies

**SUSTAINABILITY LITERACY IN HIGHER EDUCATION:
AN ASSESSMENT OF THE AMERICAN UNIVERSITY IN CAIRO'S
STUDENTS**

A Thesis Submitted to

Center for Sustainable Development

in partial fulfillment of the requirements for
the degree of Master of Science in Sustainable Development

by Yomna El-Awamri

Under the supervision of:

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27, May, 2015

ABSTRACT

After the emergence of the concept of sustainable development and the realization that human exploitation is the main cause for environmental degradation, calls for a more educated public has been issued and the concepts of sustainability literacy and education for sustainable development were born. The purpose of this study is to assess the sustainability literacy of higher education Egyptian students currently enrolled in the American University in Cairo and find out the factors affecting their scores. The Sustainability Literacy Test developed by “The Higher Education Sustainability Initiative” was used to measure the sustainability literacy of students from four different schools at the University. It is divided into 11 modules with each tackling an issue under the umbrella of sustainable development. To find out the factors affecting the test’s scores, an accompanying questionnaire and interviews were conducted to get the feedback of both students and faculty respectively. Additionally, the effectiveness of one course that tackles sustainable development was measured by administering the sustainability literacy test pre and post the course and comparing between the results. The results show that the students have a low level of sustainability literacy in comparison to global results. Weak patterns were identified and students scored lowest at questions addressing environmental issues followed by social trends and human rights. They showed a significantly better understanding of the economic trends. According to the results of the questionnaire and the professors’ interviews, the two main factors behind higher scores are interest level and education. Students from majors in relation to sustainable development showed a better understanding of it than others who had no contact with it. The review of literature and the results suggest a reorientation of existing curricula to include sustainable development and using more innovative learning techniques are ways to improve sustainability literacy.

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ACRONYMS

AUC	American University in Cairo
ESD	Education for sustainable development
GAPP	School of Global Affairs & Public Policy
Grads	Graduate students
PRME	UN Global Compact's Principles for Responsible Management Education
SD	Sustainable development/ sustainability
SSDV	Graduate program for sustainable development
SSE	School of Sciences & Engineering
Undergrads	Undergraduate students

I. INTRODUCTION

1.1. Background of the Problem

“Most people in the world today have an immediate and intuitive sense of the urgent need to build a sustainable future. They may not be able to provide a precise definition of ‘sustainable development’ or ‘sustainability’ - indeed, even experts debate that issue - but they clearly sense the danger and the need for informed action. They smell the problem in the air; they taste it in their water; they see it in more congested living spaces and blemished landscapes; they read about it in the newspapers and hear about it on radio and television.”

(UNESCO 2002)

After the emergence of the concept of sustainable development and the realization that human exploitation is the main cause for climate change and environmental degradation, calls for a more educated public has been issued. More efforts have been exerted to raise awareness regarding sustainability, international conferences and conventions were assembled to come up with concrete solutions for this problem, such as the United Nations Conference on Sustainable Development (Rio+20), its Agenda 21 and the Kyoto Protocol. And finally, the concept of Education for Sustainable Development has emerged. (Calder & Clugston, 2005)

Many initiatives have been launched to educate for sustainable development, mainly focused on a curricula change and awareness campaigns. Universities all over the world have already established curricula transformations to embed the concepts of sustainable development including its three dimensions, the environmental, economic and social ones, into its already established curricula in all disciplines (OECD, 2007). Moreover, Egypt’s endeavors in this field seem promising despite the many problems of the Egyptian educational system. Several universities in Egypt have launched centers for sustainable development that aim to raise the awareness of the students and incorporate sustainability in the available curricula. This was under the TEMPUS EduCamp project which is a European–Egyptian project that seeks to incorporate the key concepts of sustainable development into public school curricula and achieve public understanding of sustainable development. They aim to do this by partnering with

different stakeholders to change pedagogical practices and providing teachers with training on how to inject sustainable development into curricula. So far this project has succeeded in developing ESD resource kits for schools. These kits offer activities related to biodiversity, agriculture, energy, and water for teachers and students. They have also succeeded in developing a training of trainers program to better qualify teachers to teach for sustainable development. According to a report by the founders of the project in 2015, it is still too early to assess the success or failure of the EduCamp project due to its long term nature. However, the project has had a positive impact on the teachers' and students' performances and phase two is now being implemented in Al-Waraq area. (Sewilam et al. 2015)

1.2. Problem Statement

There is not enough information regarding sustainability literacy levels among Egyptian students that would allow and aide the design of suitable interventions to improve sustainability literacy in Egypt.

1.3. Research Gap

There seems to be a gap in assessing sustainability literacy of students' in Egypt, whether to measure the baseline sustainability literacy of students in different educational institutions or to assess the impact of Egyptian initiatives promoting education for sustainable development. More studies are in need to evaluate these efforts for ESD in Egypt and in turn find effective methods to improve sustainability literacy.

1.4. Purpose of the Study

This research seeks to study the important issue of sustainability literacy of Egyptian students in higher education institutions, specifically the American University in Cairo's students. Its aim is to determine the weakness patterns in the sustainability knowledge of students coming from different majors and backgrounds and come up with solutions and suitable interventions to alleviate the problem. One intervention assessed in this study is in the shape of a course that sheds light on the issue of sustainability/sustainable development, which is a Business Ethics & Environment course offered to Business undergraduate students. In assessing

these types of interventions we can provide insight on how to tackle the problem of sustainability literacy in higher education in Egypt and deliver suitable recommendations to AUC and the community as a whole to improve sustainability literacy.

1.5. Scope of the Study

This study seeks to measure the level of sustainability literacy of AUC students in the American University in Cairo enrolled within a certain period of time from the Fall of 2014 to the Spring of 2015 by using the Sustainability literacy test. This test was launched by “The Higher Education Sustainability Initiative” and the results of its pilot were presented at the Nagoya conference in November 2014. It’s a multiple choice questionnaire of 50 online questions assessing the minimum knowledge level in economic, social and environmental dimensions for higher education students. It is applicable for all countries all over the world, and in any kind of Higher Education Institution and any type of students (Bachelors, Masters, MBAs, and PhD), (Sustainability literacy test website 2014).

In order to make sure that the students have a full basic understanding of the situation of our planet, the test offers a wide range of questions, focusing on general knowledge about the three sustainable development dimensions: social, economic and environmental. It also tests the students’ understanding of the planet and the society’s dynamics such as the greenhouse effect, carbon cycle and the responsibility of organizations in our society and the responsibility of employees and citizens, respectively.

The second part of the study is concerned with finding out the factors affecting the sustainability literacy of students. After taking the test the students are asked to fill in a questionnaire, where they will provide their views on how they were able to solve the test and what possible interventions could have helped them get a higher score. Furthermore, the study will apply one intervention on a small group of students from a certain major and will measure their sustainability literacy before and after the intervention, which is a course that tackles the sustainability issue, and see how effective it was.

1.6. Research Questions

This brings us to the research question of this study.

1. Are the Egyptian students in the American University in Cairo sustainably literate?
2. If not, at which parts do they display weakness?
3. Do their majors affect their level of sustainability literacy?
4. Which factors affect their sustainability literacy?
5. Can sustainable development-related courses affect their performance in the test?

1.7. Research Hypotheses

According to the definition of sustainable development, it is not only concerned with one specific dimension, whether economic, social or environmental, but encompasses all three of them. For this reason, this study seeks to test the knowledge of students regarding the three dimensions in comparison to their majors and backgrounds. Graduate and Undergraduate students from four different majors are selected as follows: Engineering, Business, Public Policy & Public Administration, and Sustainable Development.

Students from different majors will score high in the dimension related to their interest and studies and vice versa. Engineering and Sustainable Development students will show high scores in the environmental section and will perform weaker in the other two dimensions, due to the focus of these two majors on the environmental dimension of sustainability. On the other hand, Business and Economics students will score high in the economic dimension questions and low on the environmental and social dimensions questions. In regards to the public policy and public administration, students will score high in the social dimension questions and low in the environmental and economic dimension question.

Here are the hypotheses for this part of the study:

1. H_0 : *The mean scores of the sample will be = the global mean score*
 H_1 : *The mean scores of the sample will be \neq the global mean score*

2. H_0 : *The mean scores of the graduate students in AUC \leq the mean score of undergrads*
 H_1 : *The mean scores of the graduate students in AUC $>$ the mean score of undergrads*

3. H_0 : *There is no difference in the modules' scores between different majors*
 H_1 : *There is a difference in the modules score between different majors*

The second part of the study is concerned with the factors affecting the student's sustainability literacy levels. It is predicted that that aside from the students' majors, their educational and professional background and personal interest are amongst the highest factors affecting sustainability literacy.

4. H_0 : *Educational and professional backgrounds and personal interest have no significant effect on the students' mean scores*
 H_1 : *Educational and professional backgrounds and personal interest have a significant effect on the students' mean scores*

Regarding the Business ethics course intervention, it is predicted that there will be a difference between their scores after and before taking the course. Here is the hypothesis:

5. H_0 : *The difference between the mean scores of students after and before taking the course is equal*
 H_1 : *The difference between the mean scores of students after and before taking the course is not equal*

2. LITERATURE REVIEW

To assess sustainability literacy, one must have a clear understanding of what it is, its roots and how it can be achieved. This review seeks to shed light on different concepts that are the basis for sustainability literacy such as sustainable development and education for sustainable development. It starts with an overview of sustainable development and moves forward to highlight the history of education for sustainable development and its origins, summarizing efforts conducted in the endeavor to educate for sustainable development. Additionally, the concept of sustainability literacy and how it can be achieved is discussed. This review concludes with a summary of the previous efforts to assess sustainability literacy and their major findings.

2.1. Overview of sustainable development

As the effects of natural resources exploitation by humans started escalating into catastrophes like floods, droughts and tsunamis that occurred as a result of climate change and global warming, the world started taking notice of the concept of sustainability (Intergovernmental panel on climate change (IPCC) 2007). As a result governments and international organizations started raising awareness regarding issues such as environmental degradation and climate change. After the release of the Brundtland report of the world commission on Environment and Development in 1987, which was followed by the earth summit in 1992 in Rio; it was declared that sustainable development was the way to go forward. It was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 2002). According to the United Nations 2002, the major challenge now is to live and work sustainably, so that all the needs and wants of people from different countries and backgrounds can be fulfilled without degrading the natural resources that all our lives and the lives of future generations depend on. In other words, the triple bottom approach emerged as the new direction for development. It aims to form a more cohesive and holistic goal that combines the three economic, social and environmental dimensions, to achieve the human wellbeing without compromising the environment, thus achieving the goal of sustainable development. (Castro 2004; Dale & Newman 2005; and Sachs 2012)

2.2. History of Education for sustainable development

As the world started drawing plans to attain sustainable development, they agreed that one of the main challenges they faced is making the public aware of it. International organizations highlighted the important role that education and awareness play in the achievement of sustainable development, which led to the emergence of a new concept called Education for sustainable development (ESD). The UNESCO's website defines Education for sustainable Development as "a learning process (or approach to teaching) based on the ideals and principles that underlie sustainability and is concerned with all levels and types of learning to provide quality education and foster sustainable human development – learning to know, learning to be, learning to live together, learning to do and learning to transform oneself and society".

The roots of education for sustainable development go back to environmental education before its reconciliation with the other two dimensions –social and economic- to complete the concept of ESD. In the 1970s, new support for environmental education started growing leading to the passage of the national Environmental Education Act in the United States. In Nevada 1970, the first internationally accepted definition of environmental education was issued, where it was followed by the launch of an International Environmental Education Program in the UN conference on the Human Environment (Habitat 1) in Stockholm. Moreover in 1974, the UNESCO and UNEP launched a conference in Belgrade, which became later the basis for the Intergovernmental conference on Environmental Education in Tbilisi in 1977. The Tbilisi conference's findings have later contributed to the production of Agenda 21 which is a detailed action plan that provides a roadmap to achieve a sustainable future. "The Tbilisi Declaration advocated for an education that would provide awareness to the people regarding social, economic and political issues in both urban and rural areas, empower each individual with the knowledge needed to protect and improve the environment and for all society's stakeholders to develop new behavioral patterns towards the environment". (Tilbury et al 2002, as cited in El-Awamri, 2013)

However, according to Fien (as cited in Tilbury et al 2002) the social and economic features called for by the Tbilisi conference were ignored by educators with the focus on the environmental aspect only until the 1980s, 1990s, where a rethinking of the role of education in sustainable development occurred. He believes that the focus of education (and environmental education) should be extended from schools into the community. He argues that sustainability education should not be confined to academic courses but as a participatory process, should involve all aspects of civil society, as well as those of businesses and public services.

Growing concerns regarding poverty alleviation and human rights have led to the arrival of a second wave of environmental education based on Agenda 21 and the Brundtland Report, which stated that teachers play a vital role in spreading sustainable development (Tilbury et al, 2002). IUCN, UNEP, WWF (1991) argued that a sustainable lifestyle is the new direction that should be adopted by all living beings, and in order to achieve that people's behavior must change and behavioral changes can only be altered through education. Dale and Newman (2005), explained education for sustainable development as a way to produce individuals and societies who can define problems from different perspectives and draw linkages between multi-disciplines so that implement solutions that are holistic in their outlook and eventually their application.

In 1996, the Commission on Sustainable Development (CSD) reviewed Agenda 21's chapter 36 and declared that it is of great importance to focus on the role of education for sustainable development as a way to alter unsustainable production and consumption patterns (Connect: UNESCO-UNEP newsletter 1996). Two years later in May 1998, the CSD specified that "a fundamental prerequisite for sustainable development is an adequately financed and effective educational system at all levels, that is relevant to the implementation of all chapters of Agenda 21", (Sustainable Development Knowledge Platform website, 2014).

Agenda 21 was then adopted in the first UN Conference on Environment and Development (UNCED) which was held in Rio de Janeiro in 1992. It was declared as an action plan for Sustainable Development with detailed chapters on how to achieve this plan and which parties will be involved in this initiative to realize a sustainable future. For the first time, major groups were assigned to specific roles in the sustainable development process and follow ups

have been conducted to review the progress of all partners in the implementation of Agenda 21. Ten years later, a follow-up conference was carried out in Johannesburg and was called the World Summit on Sustainable Development (WSSD). Its purpose was to reaffirm the commitment of all partners in the endeavor to fulfill a sustainable development. (“Rio+20 - United Nations Conference on Sustainable Development” website, 2015)

At this conference, The Higher Education Sustainability Initiative (HESI) was launched by a diverse group of committed UN partners as follows: the Executive Coordinator of Rio+20, UN DESA, UNEP, UNESCO, UN Global Compact, UN Global Compact's Principles for Responsible Management Education (PRME) and UNU (United Nations University). This initiative was launched with an aim to utilize the effect of higher education on the world, and use it as a tool to achieve sustainable development. It was launched in the hope that, as higher education is responsible for the production and education of current and future decision makers, it has a major role in building sustainable societies. Therefore, a new declaration was issued for higher education institutions to take on a new role where they promote sustainable development. This will be achieved through the integration of sustainability practices into research, teaching and by providing students with new knowledge and insights to sustainable development. (“Rio+20 - United Nations Conference on Sustainable Development website, 2015)

Additionally, in December 2002, the United Nations General Assembly launched a new initiative called “Decade of Education for Sustainable Development”. This initiative starts from 2005 until December 2014 and calls for countries to join the Rio declaration and adopt education for sustainable development as a policy for change (Lidgren, 2004). Afterwards, basic concepts and practices of ESD were clarified and were promoted for by the many initiatives sanctioned by the UNESCO such as the Education for all (EFA) program. One of the main ESD practices was a change in curricula to integrate sustainable development in core courses in all disciplines such as science and mathematics and languages. Stakeholders from education institutions from all over the world including and not limited to: Presidents, Deans and leaders of Higher Education Institutions and related organizations, recognized their role in sustainable development. They resolved to teach sustainable development concepts, and support research on sustainable development issues. They also agreed to green their campuses, aid and support sustainability efforts in their communities (Sustainability Literacy test website, 2014).

2.3. Defining Sustainability Literacy

As mentioned before environmental education has been the basis for education for sustainable development since the 1970s (Tilbury et al 2002). Likewise, sustainability literacy is derived from environmental literacy which seeks to increase the knowledge and awareness levels regarding the environment and its issues. This is done by tackling attitudes, values and behaviors and improving the problem solving and critical thinking skills of individuals so that they can come up with and carry out proper interventions for the current environmental problems. However, sustainability literacy moves a step further and encompasses not only environmental issues but all three dimensions. This can be seen in the following definition of a sustainability literate person as:

“A sustainability literate person is one who has the knowledge, attitude, values and skills needed to be able to tackle issues and implement interventions to achieve a sustainable future.” (Drogos, 2003; Dale & Newman, 2005; Winter & Cotton, 2012; Diamond and Irwin, 2013; Ansari & Stibbe 2009).

According to Dale & Newman, the goal of literacy for a certain skill or topic can only be achieved by developing specific learning objectives for the topic and mastering them (2005). This presents a problem for sustainability literacy due to its multidisciplinary foundation and its objective to reconcile together the necessities of the three dimensions without compromising any one of them. In order to master sustainability literacy one must have an understanding of the complex dynamics and conflicts between the three dimensions and have the ability to tackle problems with a broad and dynamic approach that will reconcile said conflicts (Diamond and Irwing, 2013).

A certain set of skills has to be acquired to attain sustainability literacy. One must have an understanding of the definition of sustainable development and its three dimensions as a basis and build on it other literacies such as: environmental/ecological, social and economic literacies. Additionally, one must be able to utilize research methods in an interdisciplinary manner combining between both natural and social science methodology that will allow him/her to analyze problems and issues in a more contextual way, taking in mind the multiple system

dynamics and interactions. (Drogos, 2003; Dale & Newman, 2005; Winter & Cotton, 2012; Diamond and Irwing, 2013; Ansari & Stibbe 2009).

According to Rammel (2003) as cited in Dale & Newman, 2005, adaptability is the one quality that needs to be present to be able to properly use all the aforementioned skills. He identifies it as an “adaptive flexibility, meaning the ability to address changing conditions through a process of continuous adaptive learning and the possibility to initiate new development trajectories”.

On the other hand, Diamond and Irwing (2013) believe that personal identity and the development of confidence are very important aspects in empowering individuals and in turn priming them into change makers who tackle problems and carry out plans to realize the goal of a sustainable future.

Several researchers (Diamond & Irwing 2013; Pappas, 2012; Winter & Cotton 2013; Kokkarinen & Cotgrave 2013) have provided frameworks to improve sustainability literacy. These frameworks have been summarized as follows:

- Being aware of real world issues related to sustainability; possessing a broad and balanced foundation knowledge of sustainable development, its key principles and the main conflicts & interactions between them.
- Having a personal identity and values that are aligned with sustainability; and appreciating the importance of the three sustainable development dimensions.
- Mastering a required skill set needed for sustainability that include: problem solving, systematic and creative thinking, decision making and change management skills.
- Having confidence that oneself can contribute in achieving sustainability.
- And above all, having the ability to transform theory into practice.

Furthermore, scientists have argued over proper methods for students to acquire the aforementioned skills and attitudes. In order to develop student identity, build self-confidence and have a student with the aforementioned skill set, a pedagogical reform is required. It can be achieved by using reflective discussion, or problem-based learning (PBL) as ways to be more

confident in ones reflections and in improving the students' critical thinking. (Diamond and Irwin, 2013)

As defined before sustainability literacy is not only concerned with acquiring information related to sustainable development but one must have the attitudes and values that can support this knowledge and translate it into interventions. Therefore, the issue of Sustainability Literacy assessment is a hard one to tackle. Many institutions have already formulated their own assessment tools while others have called for a more official or standardized tool for measuring sustainability literacy.

Most of the sustainability literacy assessments done have focused on the sustainability knowledge level. According to Calvert sustainability literacy assessments vary between ones focusing on general knowledge regarding sustainability or ones which focus more on the local perspective of sustainable development. There are different institutions that use these assessments as baseline data for sustainability knowledge to help them work towards the goal of sustainability literate students. They use these assessments to keep a track record of the students' sustainability literacy and on the long term to determine weakness patterns in the education of students and in turn derive ways to improve it. Some assessment surveys have already shown where can sustainability be injected into the academic curriculum, while others have easily detected those who are interested in sustainable development and may want to incorporate it into their work, whether professors, students or staff. (Calvert, 2014)

2.4. Previous efforts of ESD and assessments of sustainability literacy

Unfortunately, according to the former Director-General of UNESCO “Kōichirō Matsuura”, despite all the efforts done in this field for the past decade, we lack an important ingredient which he expanded on in the High-Level International Conference on Education for Sustainable Development at the World Summit on Sustainable Development, saying “We need to focus more on monitoring, evaluating and reporting on ESD. This is an area in which we have not done so well over the last decade. We need to be held accountable. What, then, are some of the most effective ways of moving forward?” (UNESCO, 2004).

This is why, for the past few years a lot of initiatives have been carried out to assess the performance of education institutions in the field of education for sustainable development. One of those initiatives is the Sustainability Tracking, Assessment & Rating SystemTM (STARS) which is a self-reporting framework that has been initiated by the Association for the Advancement of Sustainability in Higher Education “AASHE” to monitor the sustainability performance progress of higher education institutions. This framework was designed to help in the incorporation of sustainability into higher education’s different sectors, draw proper sustainability comparisons between different institutions, encourage progress towards sustainability and ease the sharing of information concerning practices carried out by higher education institutions to educate for sustainable development. One of the pillars of STARS is the sustainability literacy assessment which provides an incentive for colleges to assess their students in order to gain more points and improve their rating for sustainability. It is usually in the form of a test survey that is administered to the students and assesses their knowledge concerning sustainability topics and might also address values and behaviors. (AASHE website, 2014).

Moreover, at the end of the UN Decade of ESD, the UNESCO World Conference on Education for Sustainable Development in Nagoya, Japan (2014) celebrated a decade of ESD and endeavored to set an agenda for ESD beyond 2014 where monitoring and evaluation became an essential part of its goals. It launched the “Platform for sustainability performance in Education” to provide a center for sustainability assessment tools. These tools will aide higher education institutes in the monitoring and evaluation of their performance in regards to

sustainability practices and education and in turn help improve their implementation of ESD. (Sustainability Literacy Test website, 2014).

One of the tools adopted to help these measures is the sustainability literacy test which was also launched at the Nagoya conference in November 2014. This test is considered a new policy tool used by educational institutions to ensure sustainability aware future generations. Around 250 universities from 50 countries have committed to applying the sustainability literacy test to students as a prerequisite to graduating from the university, in turn initiating them into adopting a more sustainable lifestyle. (“Rio+20 - United Nations Conference on Sustainable Development,” website)

This test is a multiple choice questionnaire of 50 online questions assessing the minimum level knowledge in economic, social and environmental responsibility for higher education students. It is applicable for all countries all over the world, and in any kind of Higher Education Institution and any type of students (Bachelors, Masters, MBAs, and PhD), (Sustainability literacy test website, 2014).

The test covers a wide range of questions to check the participants’ understanding of the major challenges facing society and our planet. It focuses on general knowledge about the three sustainable development dimensions: social, economic and environmental. It also tests the students’ understanding of the planet and the society’s dynamics such as the greenhouse effect, carbon cycle and the responsibility of organizations in our society, the responsibility of employees and citizens, respectively. Furthermore, it is not only concerned with individual responsibility but also the organizational one (See core subjects and subjects’ sources in Appendix I).

As shown in Appendix I, the test is divided into 11 modules that lie under two main sections: core subjects and issues of sustainable development and core subjects and issues of social responsibility addressed in the ISO 26000 (which is an International Standard launched by the International Organization for Standardization, to provide guidelines for social responsibility). Four modules lie under the first section as follows: Founding principles for sustainable development, trends and key figures of global/local issues for the three pillars of

sustainable development; Environment, Social and Economy. The second section has 7 modules as follows: Organizational governance, Human rights, Labor practices, environment, Fair operating practices, consumer issues and community involvement and development. The topics tackled in each module are found in Appendix I.

The MCQ structure was chosen to make it easier to implement in countries all over the world. They are selected at random from a question bank where only 30 questions focus on international issues and the other 20 are localized questions focusing on each country's context. These local questions are developed by the local networks consisting of experts from academia, civil society and from the corporate world. After taking the test, there is an optional survey that has 15 questions that seek to know the background of the participants such as gender, age, economic background, major, university curriculum and other. These questions were added to the follow up questionnaire in phase two of this study in order to compare with the international level.

There is a strict review process that seeks to ensure that the test is of high quality and reliability. A review grid is used by senior advisors and representatives from international organizations and UN agencies to review the questions provide feedback to the general secretariat on whether each question is accepted, rejected, or needs clarification. The criteria used focuses on two main factors, the content and form. The first seeks to ensure that the question makes sense and has an acceptable source. As for the form of the question, it determines the level of difficulty of the question and whether the questions and their answers are clear, unbiased and easily understood.

It is worth mentioning that the test is only concerned with the knowledge level of students and not the behaviors, values and attitudes. In order to fully assess sustainability literacy other tools have to be derived to assess the values and behaviors of students in regards to sustainable development. Currently, The American University in Cairo is the only university in Egypt that is a member of this initiative. It also contributed to the development of the test's content by developing localized questions for Egypt.

Furthermore, another framework to educate for sustainable development is the Guided Research Applied Sustainability Project (GRASP) model for sustainability education. This project seeks to integrate four main pillars which are curriculum, research, operations and engagement at the university level. It will utilize them into projects that ensure students' engagement into real world issues and at the same time helps in developing campus life and the community as a whole. According to a study by Karlin, Davis, and Matthew in 2013, survey results demonstrate the effectiveness of the GRASP model as it allowed students to enjoy a positive and engaging learning experience, thus improving attitudes and values in addition to knowledge and skills development. The study concludes with a recommendation for a more experiential approach to ESD. This is backed by another study by Zeegers & Clark in 2014, which indicates that the focusing on students' engagement and allowing them to interact with different topics and reflect on learning is crucial to acquiring a balanced perspective on sustainability.

Other small scale assessments were carried out by several educational institutions to monitor and evaluate their own interventions and efforts for ESD. Pre and post intervention surveys were usually the common means to test the knowledge level. However, some of them also assessed perceptions by analyzing students' reflective journals after they studied for a course on sustainable development. (Zeegers & Clark 2014) Studies show that targeted courses, while successful are not sufficient enough to affect students' perceptions on the long term and that change across the curriculum is in need.

On the other hand, the International Institute for Sustainable Development (IISD) carried out a study in 2007 to assess the awareness and knowledge levels regarding sustainability among citizens of Manitoba, British Columbia. They developed a survey of 47 questions to test the attitude, knowledge and behavior of participants toward sustainable development. After evaluating the data using demographic information, the study showed that attitude toward sustainable development has more influence than education, age or knowledge. (IISD 2009 as cited by Wilson, 2014)

After reviewing literature regarding ESD, how it has progressed over the years, defining sustainability literacy and which measures have been taken to achieve it and assess it, this thesis means to assess the sustainability literacy of higher education students in Egypt by measuring the sustainability literacy of students coming from different disciplines at the American University in Cairo. The thesis seeks to find factors affecting the students' sustainability literacy level and whether awareness and ESD has been established effectively in the American University in Cairo.

3. RESEARCH METHODS

3.1. Methodology

In this study a sequential mixed methods approach was used to assess the sustainability literacy of students in AUC and determine the factors affecting their literacy. The study was divided into four different phases – as shown in the table 1, starting with a quantitative survey of the students' sustainability literacy level followed by an accompanying questionnaire administered to the students to get their feedback on the test. Phase three seeks to dig deeper into how to improve sustainability literacy by delivering one intervention: a business ethics and environment course and assessing the sustainability literacy of those taking it. Finally, Phase four seeks to present professors from the four targeted schools with the results of phase 1 and get their feedback on it.

3.1.1. Phase One: The Sustainability Literacy Test

The sustainability literacy test was chosen for several reasons. As discussed in the literature review, it is very hard to develop a tool to measure sustainability literacy due to sustainable development's multidisciplinary and complex nature. Therefore, the choice to use the sustainability literacy test was majorly because it wasn't developed by one institution only but by a consortium that is backed by the UNESCO as the initiator of the Higher Education Sustainability Initiative (HESI). This makes the tool a credible one that has been validated and tested before it was launched. On the other hand, the American University in Egypt has already partnered with PRME, which is a major member in the Higher Education Sustainability Initiative (HESI) consortium. Additionally, the responsible business taskforce at the AUC Business School developed localized questions for the test and has already started administering it to students. All this led to the test being a suitable, viable and credible tool to assess the sustainability literacy of students at the AUC.

Table 1: Summary of Research Methodology

Phase	Description
<u>Phase One & Two: Quantitative & Qualitative Measures</u>	
<p>Phase One:</p> <p><u>Quantitative measures</u></p> <p>The Sustainability Literacy Test “Examination Mode”</p>	<p>At least 20 students were chosen from the 4 different disciplines as mentioned below to be able to draw linkages between their backgrounds and their test’s results.</p> <ul style="list-style-type: none"> • Sustainable development graduate students • Business school: Undergraduates • Business school: graduate students • Engineering graduate students • Engineering Undergraduate students • GAPP graduate Students
<p>Phase Two:</p> <p><u>Mixed Measure</u></p> <p>Follow-up questionnaire</p>	<p>The subjects from phase one will fill in an accompanying questionnaire after finishing the test. This questionnaire seeks to provide some insight concerning the reasons each of them scored high or low in the test and which experiences contributed to their test’s outcomes.</p>
<u>Phase Three: Interventions</u>	
<p>Phase Three:</p> <p><u>Intervention</u></p> <p>Business Ethics Course as an intervention</p>	<p>The aim is to test whether the course has an effect on the sustainability literacy of business undergraduate students. They will take the test at the beginning of the semester as a pre-test and then will take the test again at the end of the semester as a post-test.</p>
<u>Phase Four: Professor’s Interviews</u>	
<p>Phase Four:</p> <p><u>Professors’ Interviews</u></p> <p>Four or five professors as representatives from the four different schools</p>	<p>Professors from the four participating schools will be interviewed after the results of phase one and two are analyzed. This will shed light on the educators’ point of view in regards to the results of the test and offer recommendations on which efforts can be done to improve the students’ sustainability literacy.</p>

3.1.2. Phase two: Follow-up questionnaire

A follow up a questionnaire was used to get a more in depth picture of the test's results. The questionnaire was designed to get the students' feedback regarding the test, and provide answers as to why certain weakness patterns appeared in specific parts of the test. Some of the questions were the same ones asked by the sustainability literacy survey while others were developed specifically for this study. A brainstorming session was carried out with the students of sustainable development program after they took the test to provide questions to be used for the questionnaire.

The questionnaire is divided into two parts: the first part asks about the background of the students: Gender, age, parents' professions, economics background, secondary and higher education. The second part asked questions about how the student was able to solve the test, whether s/he's involved or interested in sustainable development or not, which factors contributed to getting the score s/he got and how in the future his/her sustainability literacy can be improved. The contact information of the students was provided in order to ask follow up questions to the students in case some problems showed in the results on a later date. This was done on an optional, voluntary basis.

3.1.3. Phase three: Business Ethics & Environment Course as an intervention

The intervention is a course offered by the business school, called the business ethics and environment. It is concerned with environmental and ethical issues along with social responsibility of business firms. This is a quasi-experimental study as at the time of the study there was no way possible to do a control group as other students from the business school who are not taking the test didn't want to volunteer for the study. The undergraduate students take the test at the beginning of the semester and two months later they retake the test and a comparison is done between them both. This way we can measure its effect as an intervention to improve sustainability literacy.

3.1.4. Phase Four: Professors' Interviews

The Interviews with the professors seek out experts' opinions in regards to the results. The questions of the interview are open ended and seek to know the feedback of the professor on why the students from his discipline scored high in a certain part of the test while scoring low in others. It also aims to come up with measures that can be carried out to improve sustainability literacy and whether the measures suggested by the students from the questionnaire are feasible or not.

3.2. Sample description

3.2.1. Overall Sample description: Phase 1

Non-Probability Sampling was used based on a convenience sample. A nonrandom sample was not used due to the inability to have access to the university records of students and their contact information. The sample size chosen was at least 20 students from each discipline; Business, Engineering, public policy and administration, and sustainable development. The table below shows the sample collected from each discipline in the different stages of data collection.

Table 2: Sample Size collected: Sustainability Literacy test

	Sustainable Development	Engineering		Business		Public Administration / Policy	Total
	Graduate	Underg.	Graduate	Underg.	Graduate	Graduate	
Fall	8			47	31		86
Spring	15	24	22	35	5	19	120
Total	23	24	22	82	36	19	206

A sample of at least 20 students was chosen to be collected from each major to complete the overall sample size to be 120 students from four different disciplines; Business school undergraduate and graduate students, Engineering graduate and undergraduate students, sustainable development and public policy & administration. The sustainable development and public policy and administration majors are only offered to graduate students, therefore, no comparison between undergraduates and graduate students have been carried out in this study.

A total of 206 students took the test as shown in the table below. From the sustainable development discipline 23 students took the test along with 24 and 22 undergraduate and graduate engineering students respectively. From the business school 82 undergraduate students took the test along with 36 graduate or MBA student. Finally 19 students from the Public administration and public policy major took the test. Out of the entire 206 students who took the test, only 97 were willing to take the accompanying questionnaire, which is approximately 47% of the original sample collected.

3.2.2. Questionnaire Sample description: Phase 2

The sample is almost equally distributed in regards to gender with males constituting 52% out of the 97 students who took the test leaving 48% to females. Most of the students live in the city of Cairo with very few living in greater Cairo. In regards to their economic background 73% of the students who answered the survey consider themselves from a middle income background while 27% are from high one and zero percent from low income background.

On the other hand, most of the students' parents work in the field of business, management, finance and accounting with a 27% out of the 97 students who took the survey. This is followed by Engineers and technicians with a 20% and Medical and educational services coming third and fourth with 18% and 14% respectively, as shown in the figure below. Other jobs have been mentioned but haven't reached the 10% mark, such as: housewives, lawyers, governmental official, artists, army officers, etc.

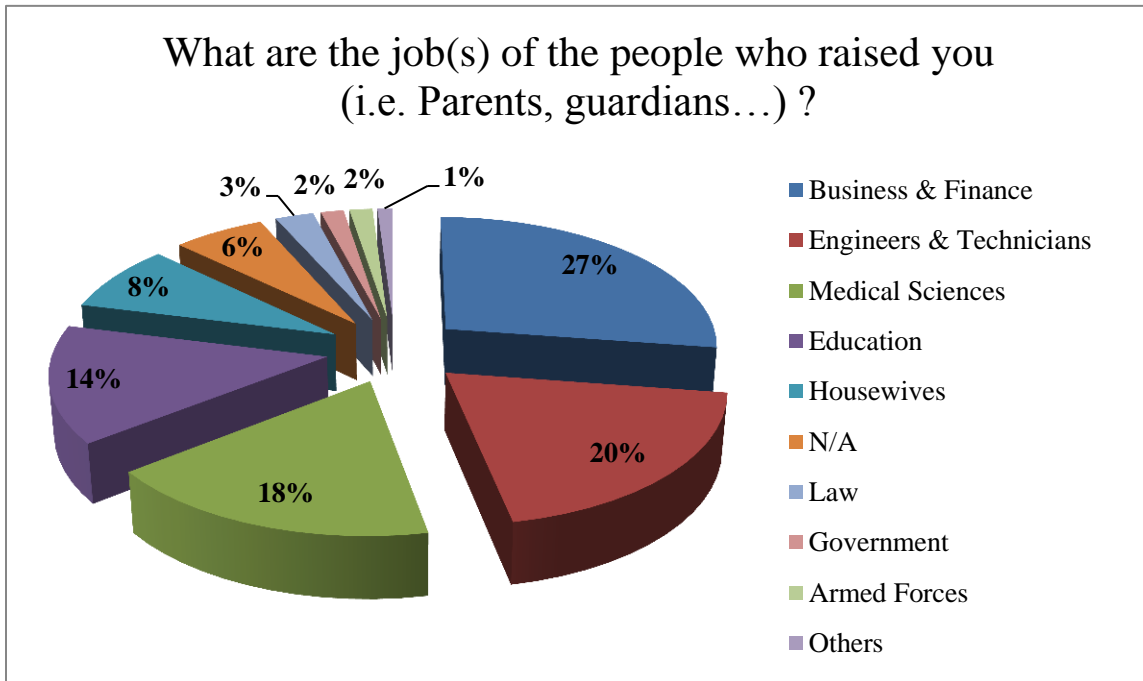


Figure 1: Sample Description - Parents' occupations

As for their educational background, 48% of students are holders of Thanaweya Amma, while 34% went to an IGCSE school and 12% an American one. As shown in the figure below, the remaining five percent were graduates of several international diplomas such as the International Baccalaureate, German Abitur, etc. On the other hand, 72% went to private universities in their undergraduate education or are currently enrolled in one, with 27% coming from public universities and only 1% studies abroad.

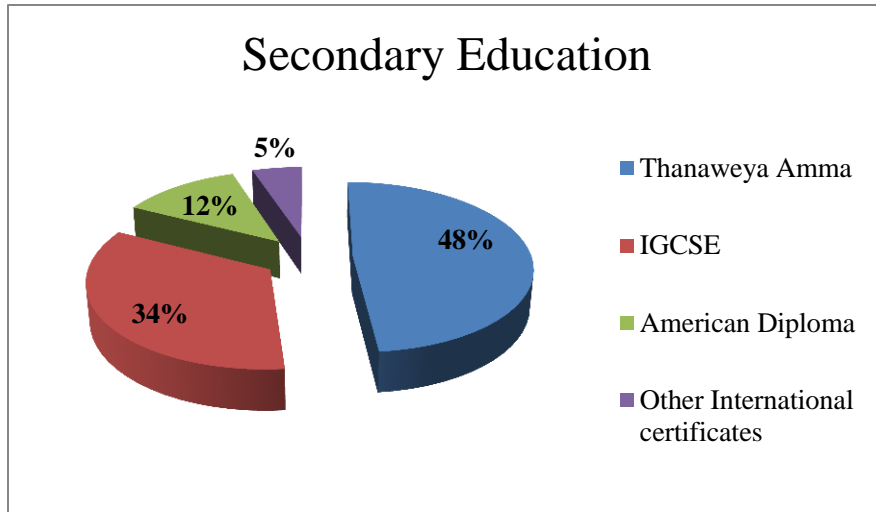


Figure 2: Sample Description - Secondary education

Regarding the majors' distribution of those who took the test and the accompanying questionnaire, as shown in the figure below, 41 engineering students from both graduates and undergraduates took the questionnaire, while 31 from the business school, 17 from the sustainable development program and 8 from public policy & administration.

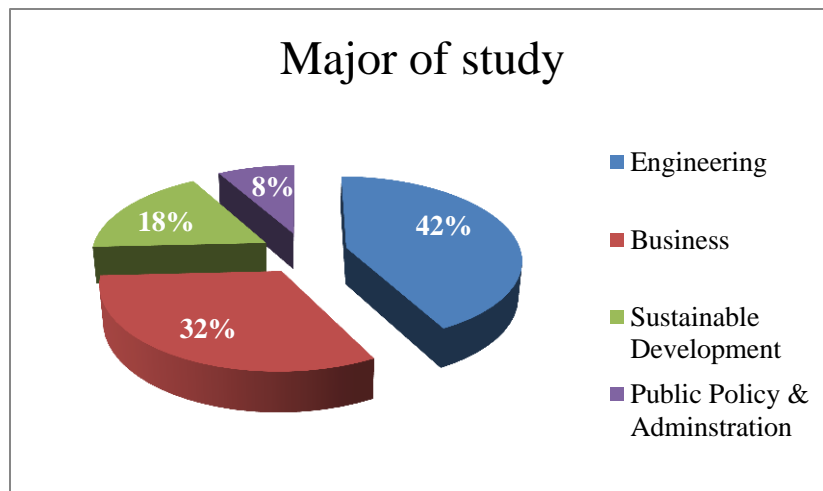


Figure 3: Sample Description - Major of study

Fifty two percent of the 97 students were undergraduate students with 47% master's students and 1% pursuing a doctorate degree. Additionally, 22% of the 97 have just started their studies, 28% are about to graduate and 51% are in between those two stages, as shown in the figure below.

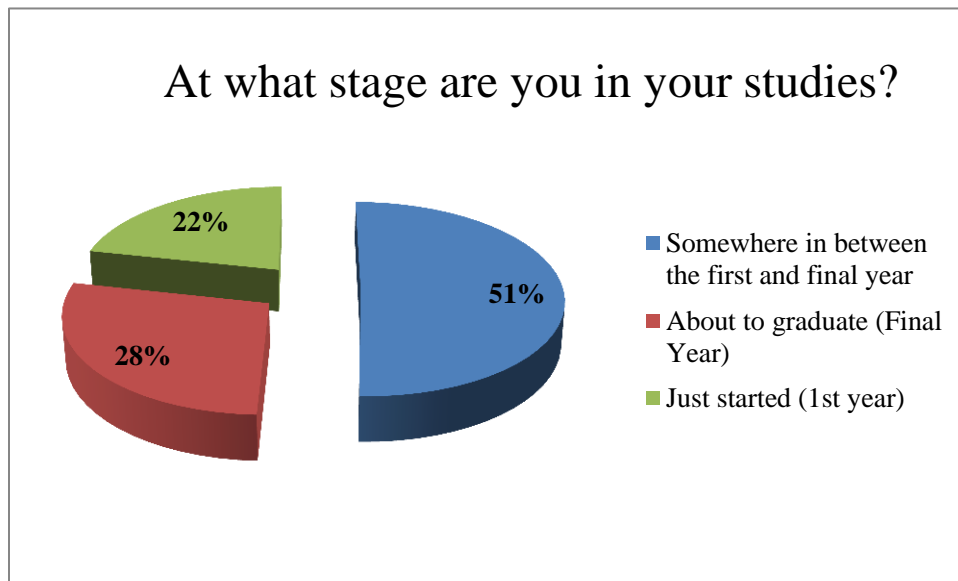


Figure 4: Sample Description - Stage of study

3.3. Research Procedures

3.3.1. Phase I & II: The sustainability Literacy Test and follow-up questionnaire

A small sample was collected by the Business School responsible business taskforce as part of its endeavor to assess sustainability literacy. As shown in the headcount table before, students from both the business school and the sustainable development program took the test in the fall 2014 while the rest were collected for the purpose of this study. The fall 2014 results were later extracted by the researcher after acquiring the IRB approval and after getting those students' permission to participate in this study. A brainstorming session was conducted with those 8 sustainable development students who took the test in the earlier semester and they were asked about their feedback and which factors have contributed to the scores they got. They were also asked about possible ways to improve sustainability literacy. The feedback from this session provided a set of questions for the questionnaire as described before in the research design.

The target sample was collected by targeting professors from the four different majors both who teach courses related to sustainable development and those who don't to be able to compare between the two and assess the effectiveness of these courses on the students' sustainability literacy. The professors along with the researcher introduced the topic to the students during class and volunteers were asked to take the test in a computer lab, in the library or using a personal laptop under the supervision of the researcher. At first, the procedures were explained to the students along with the benefits and risks of participating in the study and they signed a consent form to document their approval.

Once they sign in the consent form, the students logged into the website of the test: www.sustainabilitytest.org and created an account using the session code provided by the university, his/her student ID number and a password of his/her own choice. This is to ensure the anonymity of the students so that no one can have access to the results aside from the researcher and the test providers. The students were given 30 minutes to finish the test. After finishing the test the score appears to the students showing the percentage score in each section of the test. After studying it carefully, the students filled in the questionnaire whether using online (Google Forms) version or on paper. They also provided the researcher with their contact information in

case the need arises in the future to ask them further questions. Once the study is complete these records were destroyed.

The results of the students' scores were downloaded from the test's website as shown in the figure below. A report of the students' scores is generated, with a percentage total score for the overall test, the international questions and the local ones. Also a percentage score appears for each of the four modules in the cores issues for sustainable development while the other 7 modules are merged together into only 4 as shown in the figure below. The scores are then matched with the answers of the students who answered the questionnaire.

Only scores of students who have completed the test are taken into account in the calculation of the average rating of the student population. Questions are randomly selected out of among a wide range. The symbol "-" means that students do not have issues related to this item during the examination session.

STUDENT ID	TOTAL	CORE SUBJECTS AND ISSUES OF SUSTAINABLE DEVELOPMENT						CORE SUBJECTS AND ISSUES OF SOCIAL RESPONSIBILITY ADDRESSED IN ISO 26000			
		Total Inter/supranational	Total Local	Founding principles of sustainable development	Environment : Trends and key figures of global/local issues	Social : Trends and key figures of global/local issues	Economy : Trends and key figures of global/local issues	Organizational governance	Human rights & Community involvement and development	Environment	Fair operating practices & Labour practices & Consumer issues
	24%	26.67%	20%	40%	0%	20%	60%	0%	50%	0%	0%
	44%	46.67%	40%	80%	18.18%	70%	80%	33.33%	28.57%	0%	50%
	8%	10%	5%	20%	0%	0%	60%	0%	7.14%	0%	0%
	40%	46.67%	30%	80%	54.55%	20%	80%	33.33%	21.43%	66.67%	0%
	36%	33.33%	40%	60%	36.36%	30%	60%	33.33%	14.29%	66.67%	50%
	38%	50%	20%	60%	45.45%	50%	40%	16.67%	28.57%	33.33%	50%
	26%	30%	20%	20%	9.09%	40%	80%	16.67%	21.43%	0%	50%
	44%	46.67%	40%	100%	45.45%	20%	80%	50%	14.29%	33.33%	50%
	not.completed	13.33%	0	60%	0%	10%	20%	0%	0%	0%	0%
	not.completed	20%	0	40%	9.09%	20%	40%	0%	7.14%	0%	not.completed
	40%	43.33%	35%	60%	27.27%	50%	40%	33.33%	42.86%	66.67%	25%
	26%	36.67%	10%	80%	0%	40%	40%	0%	28.57%	0%	25%
	12%	16.67%	5%	40%	9.09%	20%	40%	0%	7.14%	33.33%	0%
	26%	33.33%	15%	40%	18.18%	40%	40%	0%	21.43%	33.33%	50%
	24%	30%	15%	20%	27.27%	20%	40%	16.67%	28.57%	33.33%	25%
	12%	13.33%	10%	40%	9.09%	10%	40%	0%	7.14%	33.33%	0%
	38%	60%	5%	100%	27.27%	30%	80%	16.67%	21.43%	100%	50%
	10%	13.33%	5%	40%	18.18%	0%	20%	0%	0%	33.33%	0%

Figure 5: Results report - Sustainability Literacy Test

3.3.2. Phase III: The intervention

The Business environment and ethics course was chosen as an intervention as it tackles issues related to sustainability and has a large number of students (37), which will make the sample more representative as opposed to other courses which has only 5 or 6 students in total. The same procedures of administering the test were carried out for both the learning mode

intervention and the business ethics course. Before the intervention the students took the test using the same procedures explained earlier in phase I.

In the case of the business ethics class intervention the students re-took the test again two months after the start of the semester and filling in the accompanying questionnaire. The class consisted of 36 students with 33 showing up to take the pretest and only 27 of those taking the post test.

3.3.3. Statistical Analysis Procedures:

The mean scores were calculated for the overall sample (206 students), for each score in each module using the statistical package for the social sciences “SPSS” and compared with the international numbers provided by the tests’ developers (PRME). Furthermore, the mean scores for each major were calculated and compared with each other using the same statistical package.

As for the questionnaire’s results, the same statistical package was used to find out the significance and/or correlation between each the questions and the students’ scores, such as: gender, economic background, personal interest, school curricula, etc. This was done by coding the qualitative questions in order to insert the answers into the program.

It is worth noting that even though the sample is a convenience non random sample, randomness is assumed and parametric tests such as the one sample t-test and AVOVA test were used. This was done in order to be able to draw hypotheses tests and use the non parametric tests to measure the significance of the results.

3.3.4. Phase IV: Professors’ Interviews:

Five professors were chosen to interview for this phase. The professors had to have had substantial experience regarding sustainable development and come from the four different targeted schools. Representatives from each school targeted in the first phase of this study were interviewed as shown in Table 3. Furthermore, the professor who teaches the business ethics and environment class was interviewed to get her feedback on the results of the course’s assessment. The professors were chosen based on their backgrounds, current position at the University and

their experience regarding sustainable development as shown in Table 3. Most professors have experience in sustainable development or teach courses that tackle this issue.

Table 3: Background & Experience of Professors interviewed

Professor	School	Experience
Dr. Aisha Saad	Representative of the School of Global Affairs & Public Policy	Assistant professor at the American University in Cairo, teaching corporate social responsibility, core concepts of social and environmental policy and core concepts of sustainable development courses. A member of the responsible business taskforce at the business school at AUC.
Dr. Ayman Ismail	1 st Representative of the School of Business	Assistant Professor and Abdul Latif Jameel Endowed Chair of Entrepreneurship at the School of Business and one of the founders of the graduate program for sustainable development at AUC. He teaches Entrepreneurship and Small Business Management and Fundamentals of Management courses at AUC.
Dr. Hani Sewilam	Representative of the Graduate Program of Sustainable Development	Founder and current director of center for sustainable development at AUC. He teaches global changes and sustainable development and water resources at AUC
Dr. Iman Seoudi	2 nd Representative of the School of Business	Assistant Professor of Strategic Management at the American University in Cairo teaching Business environment and ethics, strategic and change management and marketing and many other Business courses. A member of the responsible business taskforce at the Business School at AUC.
Dr. Salah El-Haggag	Representative of the School of Sciences and Engineering	Chair of mechanical engineering department at AUC and one of the founders of the graduate program for sustainable development at AUC. He teaches Engineering for sustainable development, energy and mechanical engineering courses.

After explaining the aim of the study the interviews were recorded only when the professor agrees to it. The results of both the tests and the questionnaire were presented to them along with an overview of the test and its structure. Afterwards, the professors were asked about their feedback regarding the results, and which factors led to the scores. They were also asked about the commitment of each school to education for sustainable development, what areas need more focus on and which learning techniques work best in improving sustainability literacy. The interview concludes with a discussion on the measures that need to be taken to increase

sustainability literacy in Egypt and in AUC. The recordings are then transcribed into main points and the most important quotes to be used in the analysis. After the finishing of the study the records are destroyed.

4. ANALYSIS & DISCUSSION

In this section the results of the four phases will be presented and discussed. The first two phases discussed are the sustainability literacy test scores, the results of the follow-up questionnaire and the results of phase three; the intervention. Finally, phase four which is the professors' interviews will be discussed separately. All tables for the statistical tests used in this section are found in Appendix G and the transcripts for the professors interviews are in Appendix H.

4.1. Phase One: Sustainability Literacy test

This analysis presents and discusses the results of the sustainability literacy test. It starts with a comparison between the global scores and the AUC ones while the other sections focus more on comparisons within AUC. The second section of this analysis draws a comparison between the international questions AUC score and the local one. The third section compares between graduate and undergraduate AUC students, while the fourth and last section is concerned with comparing between AUC students' scores from different majors.

4.1.1. Comparison between Global and AUC Scores

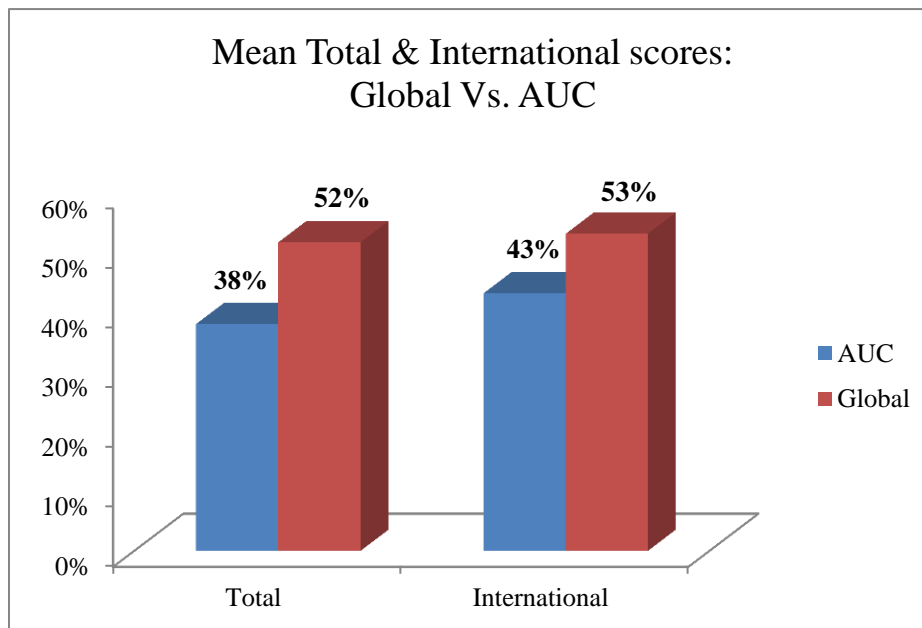


Figure 6: Global Vs. AUC scores Comparison

To compare between the global scores and those of AUC, the T-test for one sample statistics was used. As shown in the figure (6), the mean total global score is much higher than the AUC one with a 14% difference between the two scores and the AUC mean total (38%) score is less than the global one (52%). We have a long way to go in order to consider our students sustainability literate, as we are worse than the global average. On the other hand, when comparing the mean international scores, the AUC one remains lower than the global one with a p value of 0.000, which means that we can accept the null hypothesis which states that AUC scores are lower or equal to the global scores -1. This goes to show the effect of the local scores on the total scores, as clearly the lower local scores play a significant role in the low AUC score.

A closer look at the scores of each module illustrates the weakness patterns at the AUC students in comparison to the global ones as shown in Figure (7). It is noted, that the source of the results, the one year report by Carteron & Decamps presented at the 2014 Nagoya conference for education for sustainable development, chose to present the results of each module under the international questions only, as not all countries have the localized section and local questions tend to be harder than international ones. However, the results of each module score generated from the website do not differentiate between the two sections, with each module score having both local and international scores. For the sake of this study, the international global scores will be compared with the total AUC scores, with the assumption that the AUC scores will be lower due to the effect of the low local questions on the total score as mentioned in the previous section. Furthermore, the results in the report provide the score of each module separately, while as mentioned in the previous chapter, the test's seven ISO 26000 modules are combined together for easier representation. In this case, the human rights and community involvement and development are combined together in one score and the fair operating procedures, labor practices and consumer issues are combined in another section. Consequently, a comparison might prove difficult to achieve between these modules, unless the global scores are aggregated. However, it might not prove accurate as the score of each module is unknown.

Figure (7) shows that the founding principles for sustainable development module has the highest scores in both the AUC and global ones showing that students have no problem in identifying the basic definitions of sustainable development and the international and national governing institutions. In the second place comes the economic module with a global average of

61% and AUC 52%. In regards to the global scores, the economy module score is followed by the aggregation of organizational governance, consumer issues, environment, fair operating & labor practices & consumer issues with a 60% score, followed by Human rights and community involvement and development and the social module with 55% and 46% respectively. The worst scores are the environmental module both globally and at AUC with the low scores of 36 % and 28% respectively. However, the AUC scores are slightly different showing the social and human rights and community involvement modules coming right behind the economic one (39%) and the aggregation of organizational governance, consumer issues, environment, fair operating & labor practices & consumer issues coming after it with a 34% score. To compare between the global and AUC scores in each module the one sample t-test was used. The results were the same in all modules with a p-value of 0.000 proving that the results are significant and that the alternative hypothesis is true.

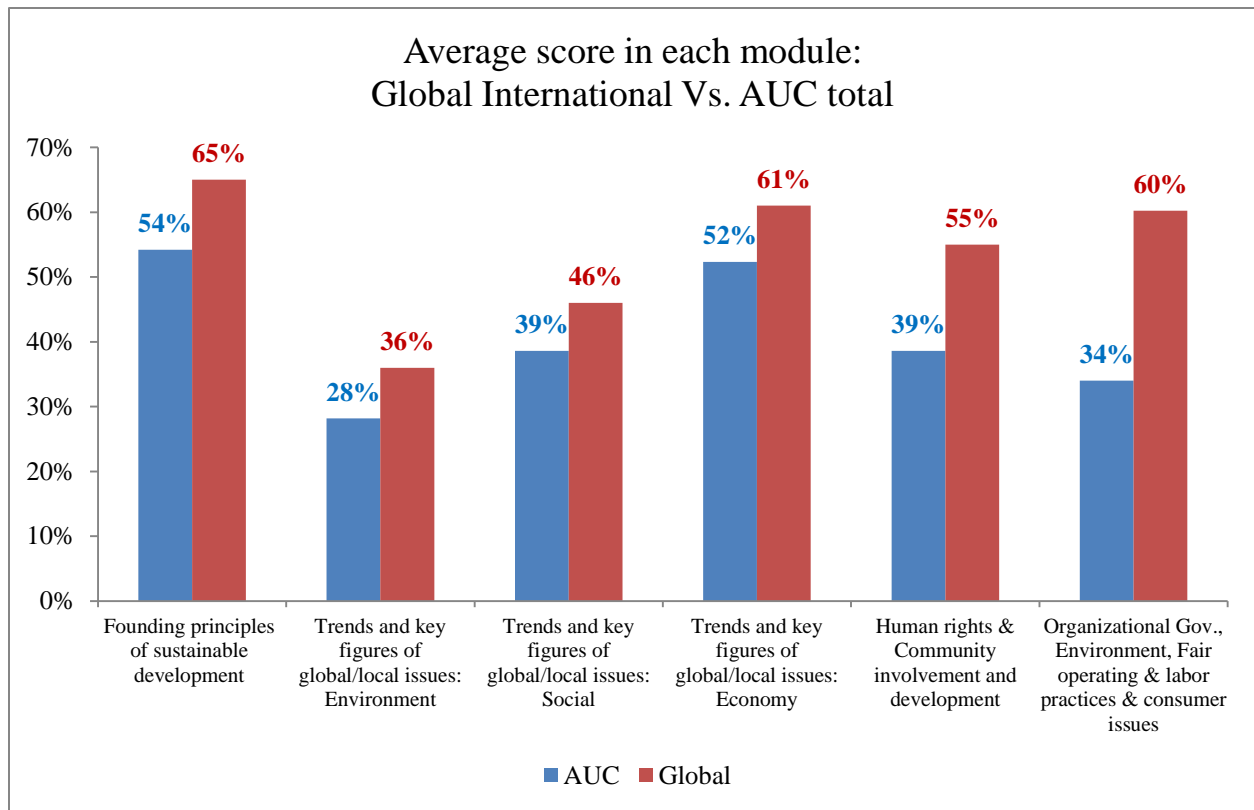


Figure 7: Average total score in each module comparison: Global Vs. AUC

These results show that the environmental aspect is weak on both the global and AUC level which addresses biodiversity, climate, pollution and energy and resource use as shown in the structure and sources of the test in Appendix A. Additionally, the results show how little do AUC students know about issues under the four modules organization governance, fair operating practices, labor practices and consumer issues which encompasses issues such as values, stakeholder engagement, decision making process, accountability, anti-corruption, responsible political involvement, fair competition, social responsibility, sustainable consumption, education and awareness, employment, social dialogue, safe working conditions and others. On the other hand, the students showed a better understanding of the economic issues addressed in the test followed by a lower understanding of both human rights and community involvement and the social trends and key issues. These results seems to conclude that maybe the educational system focuses more on the economic aspect rather than the social or environmental ones where economic growth is prioritized above social inclusion and the people’s wellbeing, with the environment almost completely absent from the curricula.

4.1.2. Comparison between International and local AUC scores

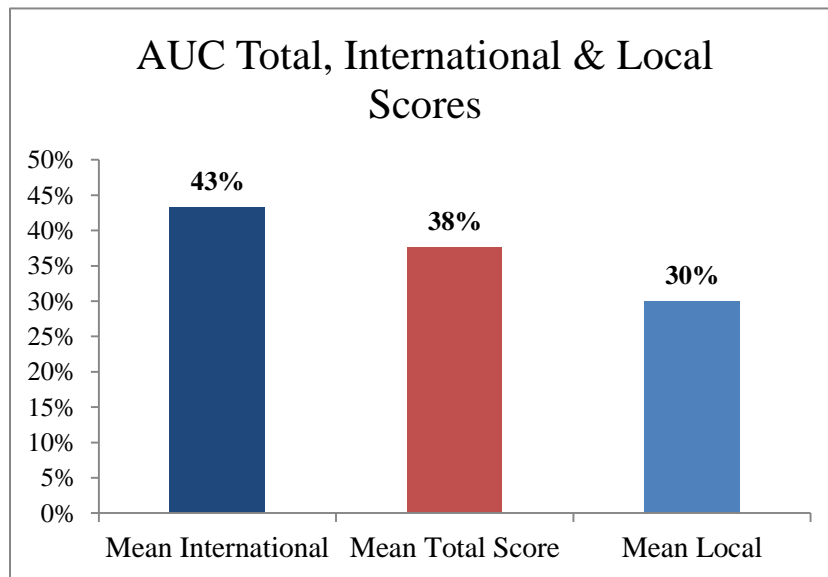


Figure 8: AUC Total, International & Local Scores Comparison

In figure (8), the AUC results show that the mean score for international questions is much higher than the local one with a 43% mean score while only 30% for the local one. This reflects how poor the AUC students’ knowledge of their country’s local context as opposed to

the international one. This can be due to other reasons, amongst them the lack of information sharing and failure of the Egyptian media to discuss issues related to sustainable development.

Another reason might be due to the difference in the difficulty level between the local and international as the business school responsible business taskforce strived to make the questions perfect or idle, making it harder than the international questions. Also, the local questions had a much smaller set than the international ones which doesn't leave room for the rotation of difficult questions.

4.1.3. Comparison between graduate and undergraduate AUC students

As mentioned before, in this study only two of the targeted disciplines, the business and engineering are available for both undergraduate and graduate students. The original hypothesis was that graduate students would have higher sustainability literacy than undergraduates, based on the assumption that graduate students would be more mature, experienced and in turn would possess a higher level of knowledge than undergraduates. In the case of the business school, using the T-test for equality of means, it's been proven that there Business graduate students have a significantly higher mean total score than the undergraduates, with the p-value equal to 0.006 and a 95% confidence level. Therefore, we can reject the null hypothesis and accept the alternative hypothesis in the case of business students as shown in table (4) below.

Table 4: Mean total score of Business graduate & undergraduate students

Major	N (Sample size)	Mean Total Score
Business Graduate Students	36	42%
Business undergraduate Students	82	37%

On the other hand, we cannot reject the hypothesis in the case of engineering students, as the T-test shows no significance in the difference between means as shown in table (5) which is only 1%. (p-value = 0.725)

Table 5: Mean total scores of Engineering graduate & undergraduate students

Major	N (Sample Size)	Mean Total Score
Engineering Undergraduate	24	30%
Engineering Graduate	22	29%

4.1.4. Comparison between different majors

In order to understand the weakness patterns in the student' sustainability literacy in each major and find out the reasons behind it, we must examine the average score of each student in total and in each module. To make sure that there is a difference in the mean scores of students in each major, the means were tested using the one way ANOVA test. The result of the test implies that at least one major average score is significantly different from the other majors with a 0.000 p-value for all three comparisons: the total, international and local scores. As shown in the figure (9) below the sustainable development students have the highest mean total score followed by the business graduate school with a 42% score and public policy and administration and business undergraduate students having an equal 37%. On the other hand, the lowest scores were achieved by the engineering school in both graduate and undergraduate students. The results are similar when divided into local and international scores as shown in Figure (9).

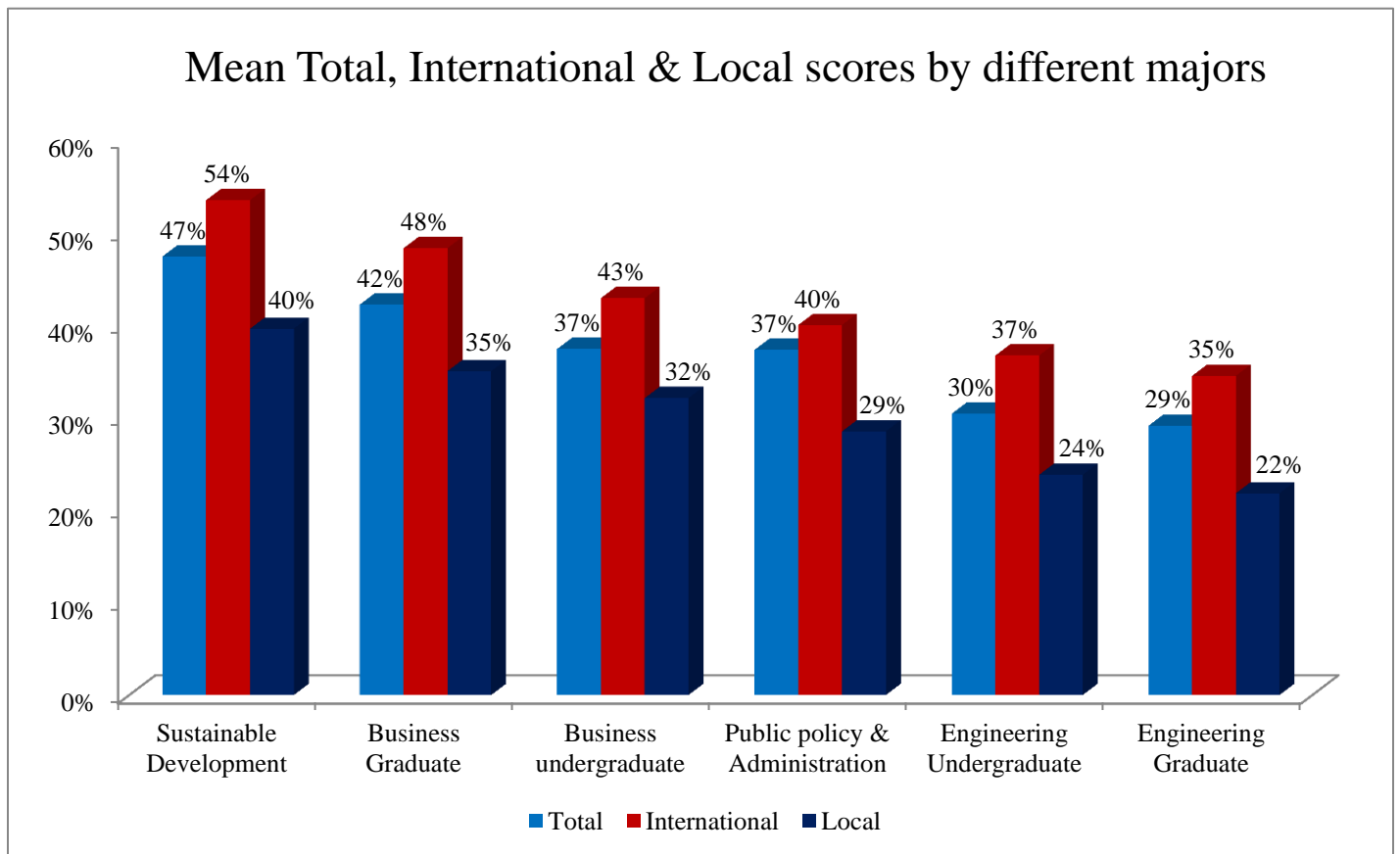


Figure 9: Mean Total, International & Local scores by different majors

On comparing between the different majors and the global scores, as shown in figure (10) we will find that the sustainable development students have achieved a quite close score to the global scores when we exclude the scores of faculty and staff from the global total international score. Sustainable development students had a 55% mean score in international questions with only 1% separating it from graduate and undergraduate global scores and 2% from graduate global scores and even scoring higher than undergraduate global students. However, all the other students scored lower than all the global students including undergraduates. These results show the effectiveness of the sustainable development graduate program as a tool to improve sustainability literacy. It is noted that this comparison is not completely valid since we can't compare only one major with a whole group of graduate or undergraduates from different schools, but for the sake of this study and due to the unavailability of a segregation of global scores we weren't able to do more than this.

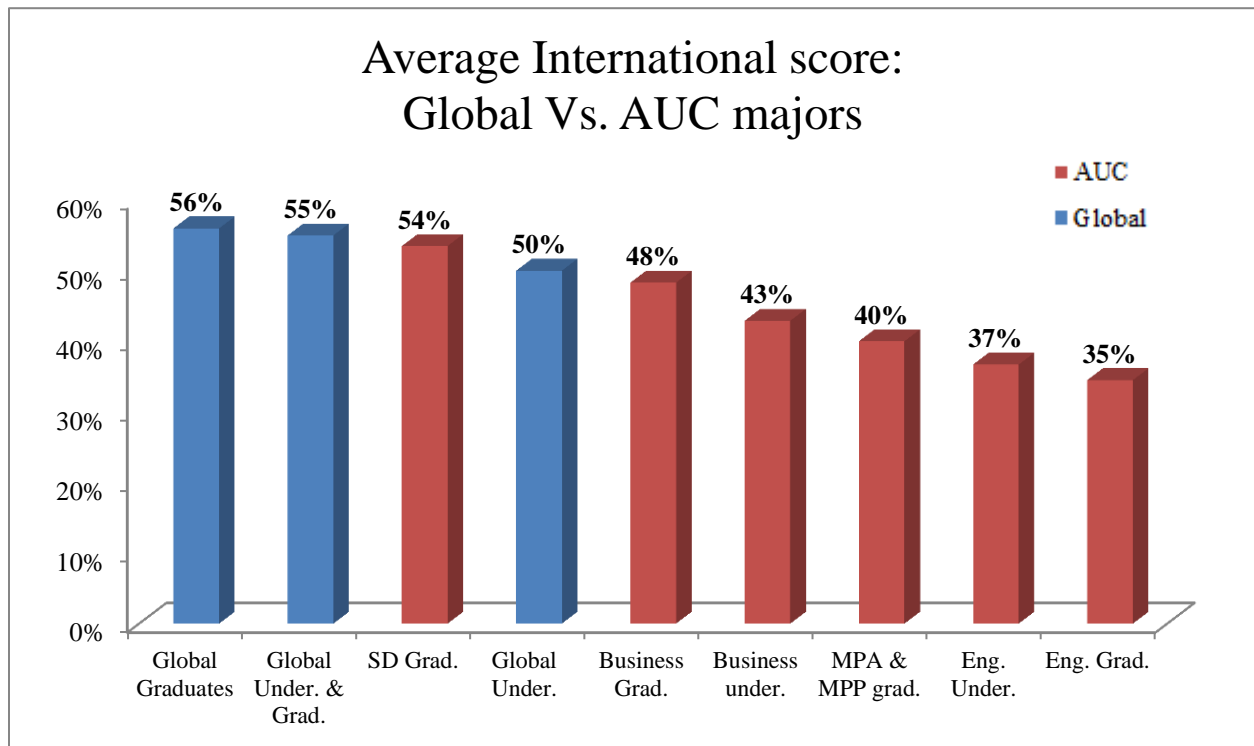


Figure 10: Average International Score - Global Vs. AUC Majors

Furthermore, the results continue to show the effectiveness of one's major on his/her sustainability literacy after the examination of the scores of different major per module. After using the one way ANOVA test in each module, the result show that at least one major is

significantly different than the other with a 95% confidence level except for the founding principles for sustainable development and the economy module. However, there is a significant difference when using a 90% confidence level (p-values = 0.044 and 0.084 respectively). This shows that amongst all majors those two modules have close scores, proving that the AUC students have a good understanding of key definitions of sustainable development and the economic context as mentioned in the previous section and this has no relation to their majors.

Table 6: Average score in each module by majors¹

Major	CORE SUBJECTS AND ISSUES OF SUSTAINABLE DEVELOPMENT				CORE SUBJECTS AND ISSUES OF SOCIAL RESPONSIBILITY ADDRESSED IN ISO 26000			
	Founding Principles of SD	Trends and key figures of global/local issues			Organizational Governance	Human rights & Community involvement and development	Environment	Fair operating practices, Labor practices & Consumer issues
		Environment	Social	Economy				
Sustainable Development	68%	39%	46%	56%	45%	46%	50%	48%
Business Graduate	54%	35%	44%	46%	33%	49%	31%	36%
Public policy & Administration	51%	22%	37%	54%	46%	42%	30%	31%
Business undergraduate	53%	28%	38%	55%	33%	38%	32%	41%
Engineering Undergraduate	48%	18%	34%	45%	26%	32%	20%	25%
Engineering Graduate	56%	25%	29%	57%	16%	24%	36%	25%
Total	54%	28%	39%	52%	33%	39%	33%	36%

On examining the scores of each major in each module, it is shown that indeed each major scored best in his/her area of expertise as shown in Table (6) or Figure (11).

Sustainable development students managed to score the highest in most modules except for the economy, organizational governance and the human rights and community involvement modules. These results emphasizes the effectiveness of the sustainable development program whether in choosing more literate students to enter the program or in the curricula administered in the program, this will be discussed in the following section (Phase two).

¹ *The highest scores are highlighted in red while the lowest are in blue.

On the other hand, Business graduate students ranked 2nd or 3rd in all modules except for the human rights and community involvement and development module where they scored highest. However, the surprising result here was the low mean score achieved in the economic module by the business students, who scored the second lowest score of 46% with only one percent separating them from ranking last. This can be attributed to the fact that business students in this sample were much higher than economics or finance students, who have more courses related to the economy than the business ones who only take one course: managerial economics.

As for the business undergraduate students they achieved mediocre scores ranking between 3rd and 4th in most of the modules except for the Fair operating practices, labor practices and consumer issues, where they ranked second after sustainable development students.

Public Policy & Administration students on the other hand ranked 4th or 5th in most modules showing really low performance in regards to the environmental modules. However, they ranked first in organizational governance and third in human rights & community involvement showing a better understanding of the decision making process and policy making dynamics which is attributed to their studies, interest in the subject and their general background.

Surprisingly, engineering graduate students excelled at the economic module ranking first with a 57% score and second in the founding principle of sustainable development. However, they ranked last in all the other modules except for the environmental ones ranking 2nd and 4th in the ISO 26000 environment and the environmental trends modules respectively. This shows that even though engineering graduate students didn't score high in total but they show higher scores in the economic, environmental modules than the other majors. Finally, engineering undergraduate students achieved the lowest scores in most of the modules ranking 5th or 6th in most of the modules.

In conclusion, after reviewing these results we can conclude that indeed, the original hypothesis was true in suggesting that majors do affect the students' scores in certain modules. Sustainable development students were able to get higher scores at most modules while engineering graduate students showed a better understanding of the environmental modules than the business or public policy majors. On the other hand, business students seem to grasp the concept of fair operating and labor practices and consumer issues better than the other majors, while public policy and administration surpassed all other majors in their area of expertise, i.e. organizational governance.

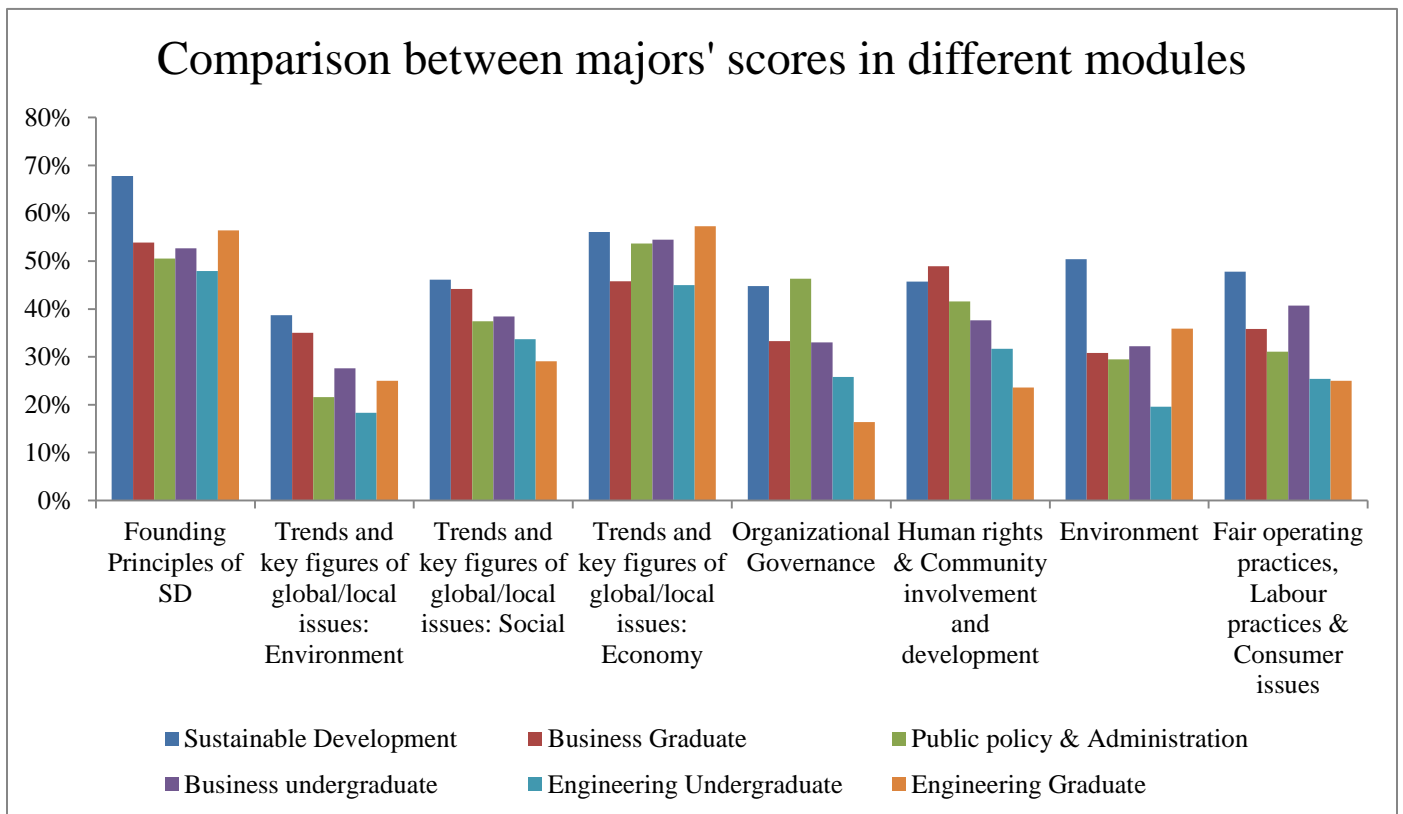


Figure 11: Average scores in each module by different majors

4.2. Phase Two: Questionnaire:

This section presents and discusses the results of the follow up questionnaire. The results are categorized into themes according to the different factors affecting the students' sustainability literacy. All percentages mentioned below were based on the entire sample of 97 students who filled out the questionnaire, unless otherwise specified.

4.2.1. Demographics

- **Age:** using Pearson correlation test to see the effect of Age on the students' sustainability literacy, we can accept with a 95% confidence level that age does indeed have a relationship with sustainability literacy. However, the correlation is weak ($p\text{-value} = 0.018$), meaning that although age has an effect on students' sustainability literacy, it is in fact, a mild one.
- **Economic Background:** the t-test results were insignificant which illustrates how economic background has no significant effect on the students' sustainability literacy. ($p\text{-value} = 0.874$)
- **City of residence:** As shown in the sample description, most students lived in Cairo or the greater Cairo region, showing no relation between place of residence and sustainability literacy.
- **Parents' occupation:** The one-way ANOVA test was used to measure the correlation between the parents' occupation and the students' sustainability literacy after categorizing the occupations into 9 categories as shown in the sample description in Figure (1). The results prove that there is no correlation between the parents' occupation and the students' score. Therefore, the parent's occupation has no effect on the students' sustainability literacy. ($p\text{-value} = 0.873$ and 0.823 for mother's and father's occupations, respectively)

4.2.2. Interest level regarding sustainability/ sustainable development:

Three questions were asked of the student to assess the effect of their level of interest regarding sustainable development in relation to their score. The students' were asked about their level of interest in sustainable development, whether they're involved in it or not and whether

they follow news regarding sustainability literacy or not. Using the t-test to measure the significance of their answers, all three questions proved to be of considerable significance at 95% confidence interval with p-values = 0.000, 0.011 and 0.000 respectively. For the sake of this analysis, the choices given to the students were aggregated and we compared between two major choices. The level of interest question shown in Figure (12), the occasionally interested, often interested and not at all choices showed no significance difference between their results, however when combined together and measured against the always interested choice, it showed a high significance at 95% confidence interval using the T-test for Equality of Means. The other question asking about following up with the news, the choices rarely, often, and never were combined together similarly and measured against Try to all the time, showing a significant difference between the two choices using the same statistical test. These results prove that those who are interested in sustainable development are more likely to score higher in the test. Likewise, those who follow the news or are involved in sustainable development will have a high level of sustainability literacy.

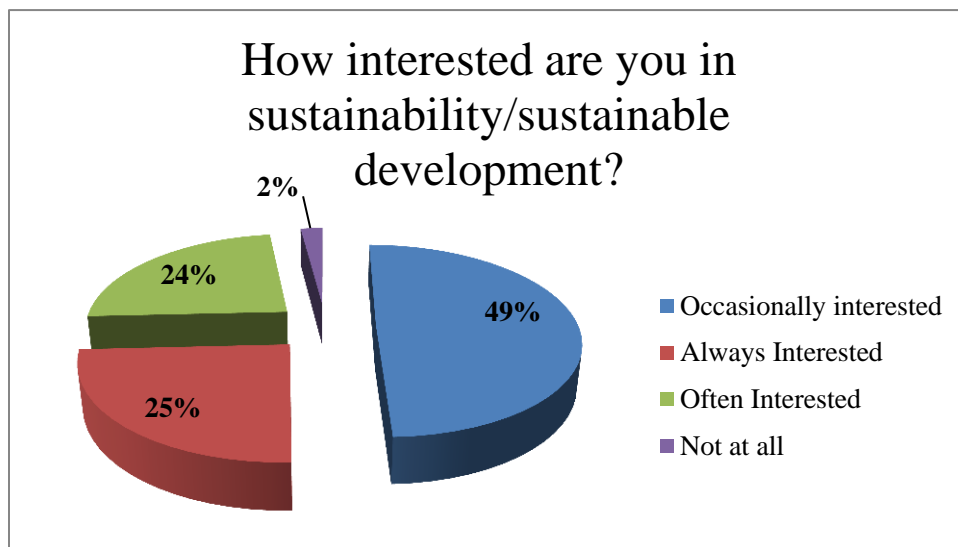


Figure 12: Questionnaire - Level of interest in sustainable development

However, when asked about the level of involvement regarding sustainable development, only 23% of the students responded with Yes, leaving the majority not involved in it. Although a depressing thought, but this goes to explain the low scores of the students from all majors and allows us to draw reasons behind these results. Only those who are interested or involved in sustainable development follow the news and in turn know more about it and in turn have higher

levels of sustainability literacy. Moreover, when asked whether they were interested in implementing sustainability in their work, 91% answered YES, showing that the sample gathered are really interested in sustainability. These results show that the sample might be biased.

4.2.3. Education

The students were asked several questions regarding their educational background, whether their current studies have affected their scores or not.

The results were as follows:

- **Secondary education:** using the t-test compare between those students' who graduated from national schools and those who graduated from international ones, it was proven that there is no significant difference between those two categories with a p-value of 0.647. Therefore, in this instance sustainability literacy is not affected by type of secondary education.
- **Higher education:** Measuring those graduate students who went to public schools or private ones, it was proven that there is no significant difference between the scores of those two categories. However, in regards to the level of degree, as in graduate or undergraduate, the t-test showed that there is a significant difference between those two categories with the p-value = 0.036 and a 95% confidence interval. This goes to support the results of phase one, where the business graduate students had a higher level of sustainability literacy than the undergraduate students.
- **Sustainable development in curricula:** Unfortunately, the scores of those students who admitted to having sustainability/sustainable development in the curricula they studied showed no significant difference between those who did not after using the one way ANOVA test (p-value = 0.185). This shows a conflict between the results of phase one where it was proven the positive effect of the major on the students' sustainability literacy. Either personal interest in the subject related to one's major plays a bigger role than university curricula or the students' have benefited from these courses but not through the improvement of

their knowledge, but rather their values or perceptions regarding sustainable development, which are not measured by the sustainability literacy test. (Figure 13)

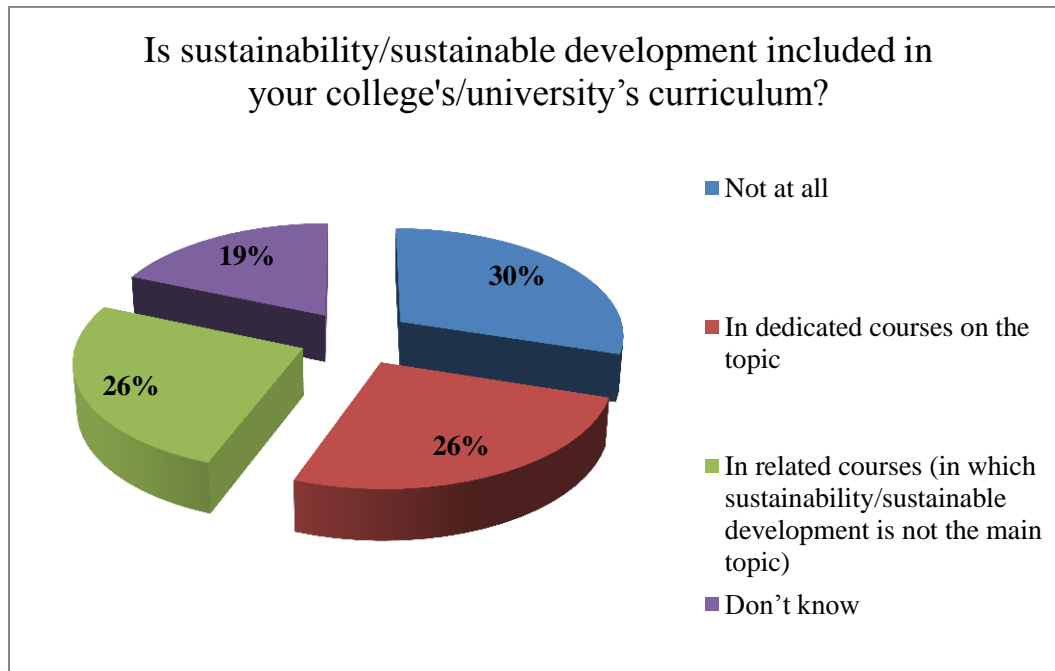


Figure 13: Questionnaire - Inclusion of SD in curricula

- **Assessment of sustainability literacy in educational institutions:** When asked whether assessments of sustainability literacy are beneficial or not and if reporting back the results of these assessments to educators will help or not, 86% percent of the students answered Yes. This explains the conflicting results regarding the relationship between the courses offered and the scores. This proves that the students who took the test are biased towards sustainability. If you have an interest in sustainable development you will be interested in taking the test and will probably get a higher score, as opposed to someone who doesn't have any interest in it.

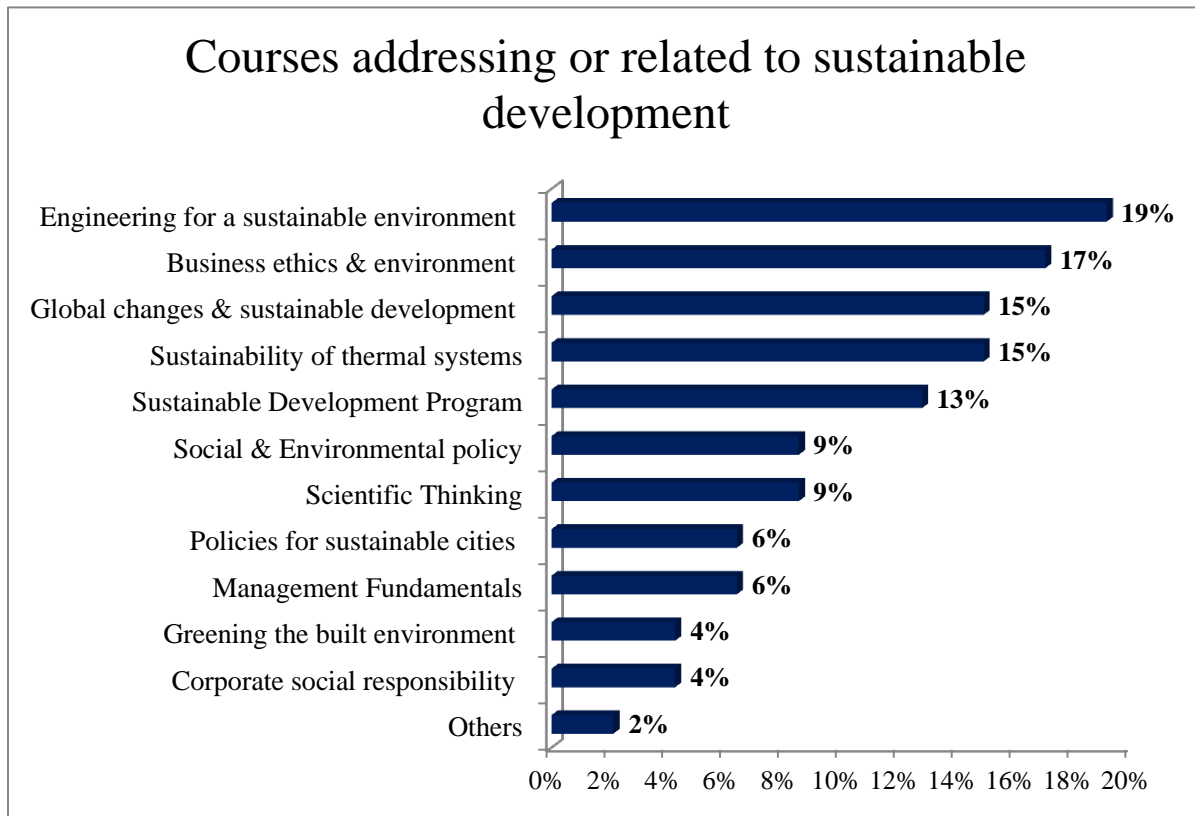


Figure 14: Questionnaire - Courses addressing/ related to SD

- Courses addressing sustainability literacy:** When asked which of the courses they have taken have improved their sustainability literacy, as shown in Figure (14), the course which highly affected the students was the Engineering for a sustainable environment followed second by the business ethics course. However, due to fact that the intervention group students all answered the questionnaire only mentioning the business ethics class, the number in this case is exaggerated in comparing to other courses. A close second was the Global changes and sustainable development and the sustainability for thermal systems. The first addresses issues such as climate change, water, sustainable consumption and production amongst others. The later addresses the energy issue from the three different perspectives or dimensions of sustainable development. Thus helping in the students' understanding of sustainable development. Most of those courses are offered in the sustainable development program. This shows that a dedication to sustainable development in curricula goes a long way in improving sustainability

literacy and that curriculum reform is needed to reach the goal of a sustainable future.

On the other hand, when asked about the reasons behind their scores, 55% percent of the students believed their personal interest in the subject was the main reason behind their scores while 47% chose their higher education. These results support the results of the previous phase where majors had a significant effect on the scores of the students. Furthermore, the results back those proved in the first part of this phase regarding personal interest and the effect of major on the scores. This goes to show that the students' perceptions about their own sustainability literacy are consistent with the proven conclusions in this study. Media was ranked 3rd in the factors affecting the students' scores which included social media, books, magazine articles and other media outlets. Figure (15)

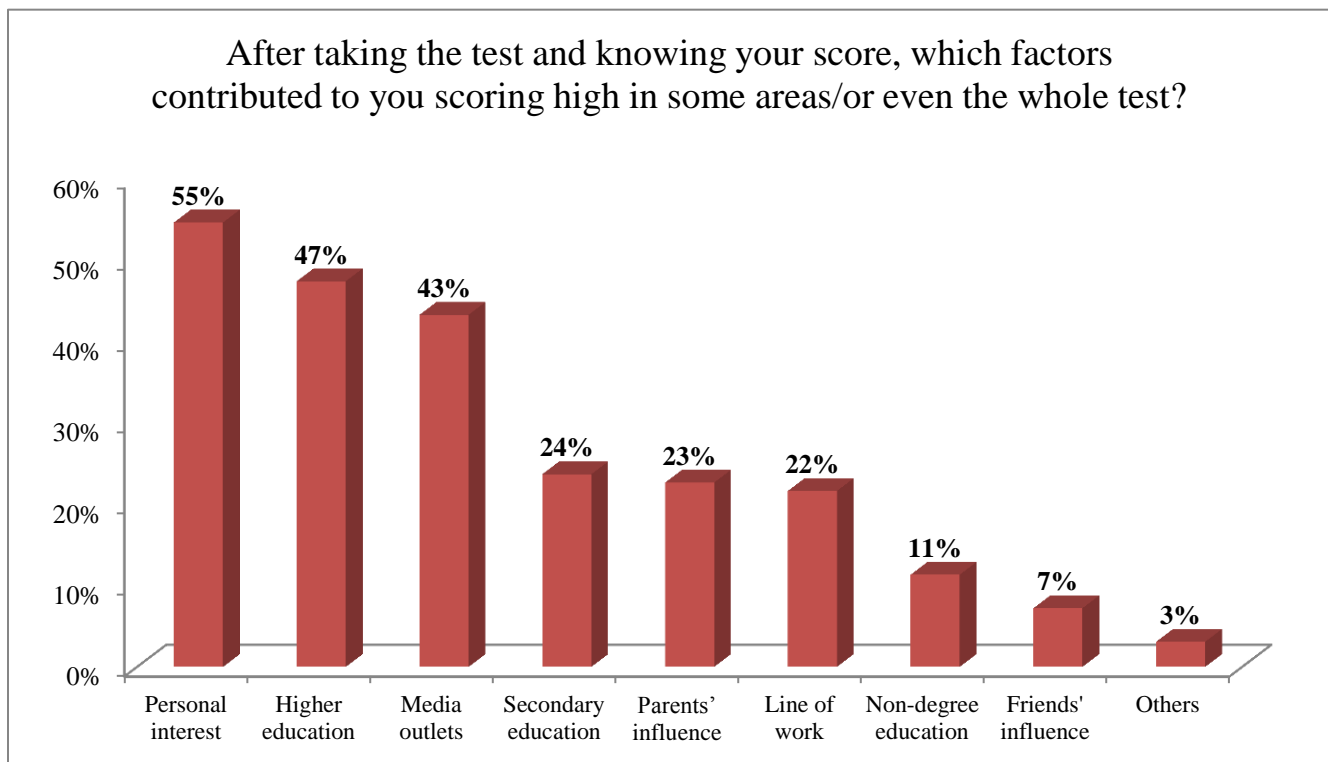


Figure 15: Questionnaire - Factors contributing to sustainability literacy test scores

Consequently, the students believed that a combination of injecting the school curricula with sustainable development in all educational stages including higher education, more media coverage and awareness by the government and civil society is best to improve sustainability literacy as shown in Figure (16) where 48% chose all of the above. On the other hand, 33% and 31% chose the injection of curricula in all educational stages and more media coverage on sustainable development as the way to go forward while only an equal 19% saw injecting sustainable development in only higher educational institutions and more awareness by the government and the civil society as the best approach to a more sustainability literate population.

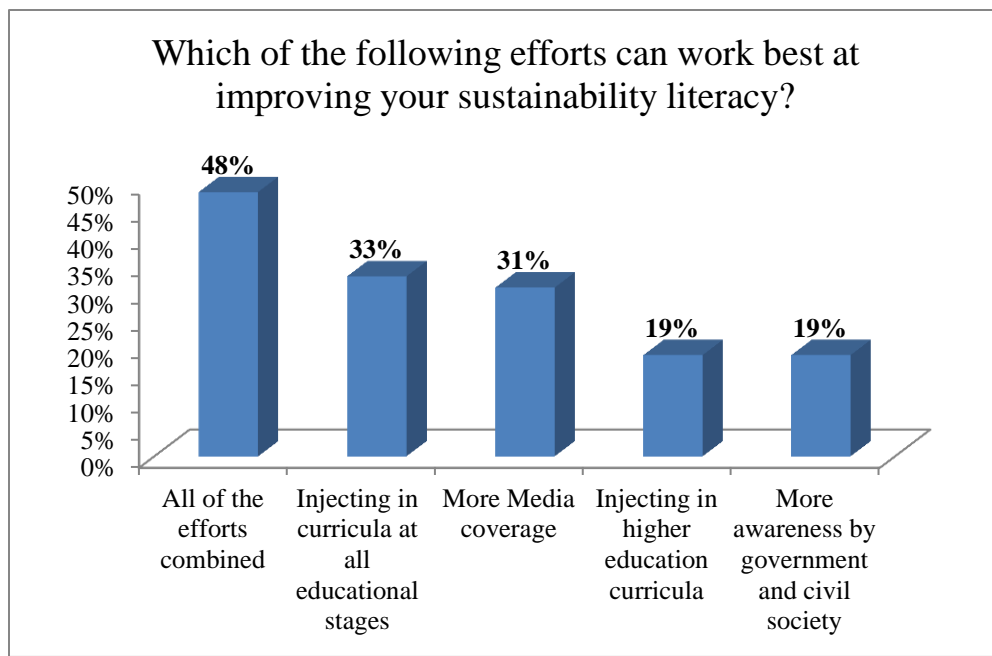


Figure 16: Questionnaire - efforts to improve sustainability literacy

4.3. Phase Three: Intervention

The results of the test shown in table (7) below, illustrate that the scores of students in most modules have decreased after taking the course. Nevertheless, to see whether there is a change or not in the students' literacy level, the one sample T-test was used to assess the significance of the mean difference for each score i.e. the difference between the post intervention score and the pre intervention one based on the following hypothesis:

The null hypothesis is that the difference equals zero

The alternative hypothesis is that the difference not equal zero

According to the d/m p-values (Sig, two tails), we can't reject the null hypotheses for all modules' scores except for the environment module score. This means that in all cases, the average score didn't change after taking the course except for environmental trend module score which is according to a 95% confidence interval has increased with a p-value of 0.0055. Thus, the Business Ethics & Environment course has a positive effect on the environmental trend score.

Table 7: Mean difference between before and after business ethics course in each module

Module	Mean difference between post and pre intervention
TOTAL	-2%
Total Inter/supranational	-1%
Total Local	-3%
Environment	14%
Trends and key figures of global/local issues: Environment	4%
Founding principles of sustainable development	-2%
Human rights & Community Involvement and development	-3%
Fair operating practices & Labor practices & Consumer issues	-4%
Trends and key figures of global/local issues: Social	-5%
Trends and key figures of global/local issues: Economy	-6%
Organizational governance	-6%

4.4. Phase Four: Professors' interviews

This section is a presentation of the results of the interviews conducted to get the professors take on the issue of sustainability literacy and understand the results of the three previous phases in this research study. Themes were drawn from the five interviews conducted as follows:

Lack of awareness regarding sustainability literacy in Egypt

The majority of the experts interviewed were not surprised by the results of the test scores as they are already aware of the existence of a problem in our educational system and the general public awareness. This fact showed in the fact that an initiative for education for sustainable development (UN decade for education for sustainable development) was initiated with a 10 year timeframe and the 10 years have been concluded last year and yet, AUC is still not even aware of it. Most experts suggest that these results are higher than reality because they are reflective of the AUC community only, which incidentally is very interested in sustainability despite the results; and do not include the other universities especially public ones, which it is predicted have a much lower sustainability literacy levels.

“The feedback is not surprising to me because I find that the exam is pretty much content based not competency based and the content is not well integrated into curriculum or into general public opinion so it doesn't surprise me that the level of general awareness -in other disciplines also, not just in these four disciplines- is quite modest and I guess the survey captures it pretty well”.

Representative of the School of Global Affairs & Public Policy

The low scores of engineering students and public policy & administration students were attributed to the focus of the programs on students acquiring technical skills relating to public administration and policy and engineering respectively. According to the 1st Representative of the School of Business, the engineering students study very technical topics as opposed to business and sustainable development students who have a wider range of topics to study and are exposed to a more holistic content. The representative of the School of Sciences and Engineering adds more by saying that so far the efforts taken in the school of sciences and engineering were

focused on the mechanical and environmental engineering and more focused on the graduate students. The representative of the Graduate Program of Sustainable Development adds to this by saying that AUC still has a long way to go especially for the undergraduate students, with the 2nd representative of the School of Business commenting on this by saying that even though there is a commitment to sustainability in the business school, more efforts needs to be done.

The role of Media and policy makers in achieving sustainability literacy

All experts emphasized the role of media and policy makers in raising the public's interest in sustainable development and in turn improve their sustainability literacy. However, they cannot do that without understanding first the concept of sustainable development in order to be able to translate it effectively into the rest of the society.

“The decision makers and the media need to understand the concept of sustainable development... here in Egypt we only talk without action... Sustainable development needs a champion to adopt this way of thinking, one who has substantial knowledge and a deep understanding of sustainability”.

Representative of the School of Sciences and Engineering

Sustainability literacy is built from the cradle

It's important to address the issue of sustainability literacy from a very early stage of a child's life. Experts agree that the personality and values of individuals should be aligned with those of sustainable development.

“Sustainable development is based on a lot of ethics... no one is watching you when you cut a tree, it [sustainable development] has to come from the heart”.

Representative of the Graduate Program of Sustainable Development

This rational is supported by Diamond and Irwing (2013) as mentioned in the review of literature as personal identity and its alignment with the values of sustainable development is the key to achieving sustainability literacy. An example of this is the business ethics course, which according to the 2nd Representative of the School of Business does not necessarily guarantee

students to act ethically once they graduate from the course. Even though the students learn to identify ethical implications, assessments like situation-based questions and case studies show that even though the students can analyze situations and ethical dilemmas and identify different decisions as unethical they still choose to make unethical decisions, which is why it is very important to build this kind of awareness and engrain these values from the early childhood.

Mainstreaming sustainable development in university curricula

Part of the problem is that sustainability literacy is still perceived as a separate entity that needs to be taught in itself and not as something that has linkages to all majors and disciplines. It is agreed that sustainable development needs to be mainstreamed in all curricula not only in higher education but in all education stages, starting with the faculty and management level who will in turn acknowledge sustainability literacy as a priority and this will translate into the curricula and eventually lead to the elevation of sustainability literacy.

This will only happen if it is recognized first and then taking tangible steps into acknowledging it as a priority. This can happen by adding sustainability literacy as a learning objective and linking it to the accreditation of the schools in a similar way to the STARS™ rating system.

“In order to make this work... sustainable development has to be added it into the learning goals of each school and then using suitable measures to regularly assess it. This process ensures that the goal is accomplished and assessed every two years and once we know it has been achieved, we can move on to a bigger one and build on it”.

2nd Representative of the School of Business

Different learning techniques to achieve sustainability literacy

Most if not all experts agreed on the effectiveness of more innovative and experiential learning techniques in helping students to better their understanding of the complexities of sustainable development issues and be able to critically develop suitable interventions.

“I try to incorporate more simulation activities more so now in teaching because the competencies and content are absorbed much more effectively... more field based work

not just case studies taken in class but to have more field based interdisciplinary visits and projects, particularly when it comes to sustainability, being able to see the reality of these themes and the complexity in applications is going to be the most effective way to elevate the sustainability literacy”.

Representative of the School of Global Affairs & Public Policy

Assessment of sustainability literacy is long term and outcome based

It is concluded that the real assessment of sustainability literacy of students is the future of those students and what they will do with the knowledge acquired in program such as sustainable development master’s program. Success in achieving sustainability literacy will be measured based on the students’ impact on the community and the initiatives or interventions that they will carry out. It’s still quite early to assess sustainability literacy for students as the program for sustainable development haven’t completed 2 years and no one has graduated from it yet and other majors still have a long way to go in order to reach a higher level of literacy.

Positive outlook: the future of sustainability literacy in Egypt

Steps have been already been taken, whether on the university level or nationally. The existence of a master’s program for sustainable development and others such as green communities is a first step towards sustainability literacy. Furthermore, sustainable development is now a topic of discussion in Egypt. The fact that there is a plan for sustainable development is a good sign, even with its ambiguity.

“Now, we hear sustainability everywhere, in the economic forum there is a sustainability strategy for Egypt even if we hate it. The strategy is indeed misleading, but starting to talk about it is creating the culture of getting used to the topic of sustainable development and with time people will understand it”.

Representative of the Graduate Program of Sustainable Development

5. CONCLUSIONS & RECOMMENDATIONS

5.1. Conclusion

After assessing the knowledge level regarding sustainable development, digging deep into the reasons behind the results of the assessment by getting the students and professors' perspective, it is now safe to conclude that in the American University in Cairo in particular, we have a low level of sustainability literacy in comparison to other countries. The weak patterns regarding sustainability literacy are apparent in the environmental dimension followed by the social one with students having a significantly better understanding of the economic dimension. We still have a long way to go to properly understand fair operating and labor practices, consumer issues, organizational governance and community involvement.

The two main factors behind higher levels of sustainability literacy are interest level and education. Students from majors in relation to sustainable development showed better understanding of the concept of sustainable development than others who had no contact with sustainability.

In conclusion, the results of all sections proved to be consistent with each other confirming the original hypotheses of this study. The experts' opinions support both the conclusions derived from the students' test scores and questionnaire measuring their perceptions. Emphasis was drawn on the importance of personal interest and education on the sustainability literacy level. Additionally, media and policy making are needed in order to improve the sustainability literacy of the public. Innovative learning techniques are the best way to go forward as suggested by the literature and character building is of essence to ensure one's sustainability literacy. Courses that tackle sustainability related issues are indeed effective as proven in the business ethics and environment course intervention where it had significant effect on the environmental literacy of students.

Media outlets and awareness efforts by the government and civil society organizations play an indispensable role in the endeavor to improve sustainability literacy to raise interest and in turn raise the sustainability literacy. Reorienting the curricula of all disciplines is essential to

elevate sustainability literacy and it should start from early in a child's life to be able to affect his/her personality and values and align it with those of sustainable development.

Finally, the sustainability literacy test is a good tool to measure the basic knowledge level of sustainability literacy. However, we need other tools that are competency oriented as opposed to content oriented in order to have a full assessment of the student's' knowledge, competencies, behaviors and values regarding sustainability and how they will react to the dynamics and complexities to the ecosystem.

5.2. Limitations

The one major limitation for the study was the inability to generalize the results and findings of the research as a result of not having access to university records and in turn not being able to use a random sample. Likewise, in the case of the intervention for the business ethics class, there was no control group.

Additionally, the sample size for each group was relatively small due to time constraints and the busy schedule of the students and professors as without incentives from AUC, very few students were willing to take the test and the professors were unable to lose 30 minutes of their class to let the students take it. Furthermore, not all schools were chosen in this study such as the School of Humanities and Social Sciences.

Moreover, there was a problem when comparing the global results with the AUC ones, as mentioned in chapter 4, the global results were produced only for the international questions without the local part to make it easier to compare between countries. On the other hand, the AUC results are produced as a total of international and local questions without differentiation between them and without providing us with the weight of the international and local questions in each module. Thus, the comparison is not an accurate one.

Finally, the internal validity of the questionnaire's results might have been compromised due to the main testing effect caused by assessing their sustainability literacy first, which may have caused a change in the students' attitudes that was not there before they took the test.

5.3. Recommendations

After conducting the study, it is now safe to derive suitable recommendations for the different stakeholders who play major roles in improving the students' sustainability literacy, as follows:

5.3.1. Recommendations for the American University in Cairo

Even though AUC has made progress in regards to promoting and implementing sustainable development/sustainability, as shown in the greening the campus initiatives, it still has a long way to go in educating for sustainable development as proven in the study. Here's a list of recommendations on how AUC can improve its endeavors for ESD:

1. It's important to recognize sustainable development and education for sustainable development at the AUC and then to take tangible steps to acknowledge them as priorities. This way, a concrete strategy for education for sustainable development could be added to the annual strategy for the university.
2. More efforts to raise the staff and faculty's awareness regarding sustainable development are needed. Acknowledging sustainable development will not matter much without making changes in the curricula. Therefore, those who are responsible for changing the curricula need to learn of ESD's importance. The combination of a solid strategy for sustainable development education and higher awareness levels of the faculty staff and professors will incentivize them into acknowledging SD in their curricula and eventually it will be translated into the elevation of the students' sustainability literacy.
3. Linking sustainability/sustainable development with the accreditation process will provide incentives for the staff to inject sustainability into their curricula and assess for it. By adding SD into the learning objectives and assessing its achievement periodically, sustainability will soon become a major pillar in all curricula.
4. Professors could focus more on undergraduate students in all majors as they are proven to be less sustainably literate than graduate students.
5. More efforts to inject all pillars of sustainable development not only a single one are needed in all schools especially in the schools of global affairs and public policy and sciences and

engineering. Due to the focus on the more technical side of the students' studies, these two majors have proved to need more integration of sustainable development into the curricula than others.

6. Assessments for sustainability literacy are important. Using the test as a way to measure the basic level of sustainability literacy knowledge for students is a good first step. It would be very beneficial if AUC adopted this study but in a larger scale by making taking the test a requirement of entry to and graduation from the school would help in knowing the effect of ESD efforts. Furthermore, students can take the test before and after certain courses that target sustainability or sustainable development to measure the course's impact. Other assessment tools are needed to measure the values, dispositions and reactions to sustainable development. This can be done by giving them case studies to solve or having them do a project and write journal reflections on it and then analyzing it.
7. Experiential learning techniques and community based learning methods are in need to improve sustainability literacy. Professors can engage students more and raise their interest in sustainable development by application rather than memorization, thus, allowing students to translate their leaning experiences into solutions and interventions that will benefit the community. This is also backed up y the literature in Diamond and Irwin, 2013.
8. It would be very beneficial if the school carried out an initiative to promote sustainability literacy on campus. This could be done by assembling all student activities' representatives and explain the importance of sustainable development in today's ecosystem and urge them to add sustainable development into their activities, projects conferences. Regular meetings with them afterwards to review their progress and offer any help or support needed will ensure the sustainability of such efforts. The graduates of the sustainable development program can also be advisers for those student activities, aiding them in implementing SD and promoting for it. This will go a long way in aligning the goals and values of sustainable development with those of future leaders who are already on their way to change the community for the better, such as Mashroo3 kheir, Developers and others. In turn those leaders will impact more students who are more predisposed to listen to their friends than to the authority of the university.
9. Another way to promote for sustainable development education at AUC is using its media channels such as AUC TV, student portals, etc. Also, preparing more talks and days for

sustainable development on campus and inviting popular and influential personalities to talk about sustainability will attract more interest in the subject.

In applying the aforementioned recommendations, AUC might be able to create a model for the improvement of sustainability literacy and then it can be replicated in other universities. AUC has many partnerships with different universities in Egypt and in case of its success in improving the students' sustainability literacy, it can continue on to promote for and implement sustainable development by aiding other schools to replicate its efforts, making it the pioneer institution in Egypt in the field of sustainable development education.

5.3.2. Recommendations for policy makers & the media

It's really important for the government and the policy makers to understand sustainable development and in turn acknowledge its importance. In doing so, more focus can be awarded to sustainable development education and more policies can be devised to incorporate sustainability education into the curricula of schools from the start of the educational level.

Furthermore, Media has a huge influence in raising the personal interest of the general population regarding certain subjects. Using this influence to promote sustainable development will in turn improve the general awareness of the public and will aid sustainability literacy elevation. Media outlets can start engaging more experts on sustainable development and offer more talks on the subject. More publications and books on sustainable development especially in Egypt are needed especially those tackling the local context as shown by this study.

5.3.3. Recommendations for the Sustainability Literacy test's improvement

In order to use this test as a way to measure the effectiveness of certain interventions or courses to improve sustainability literacy, certain changes could be made. A recalibration of the test's questions can be done to ensure that the pool of ever-changing questions can have the same level of difficulty. This will ensure that when a pre and post-test is done for the two tests are consistent and have the same level of difficulty in each module. Also, the test can be improved by unifying the difficulty level of the international and local questions and developing more local questions.

Other tools can be developed to measure values, attitudes, dispositions and reactions to sustainable development instead of only measuring the knowledge level. Situational questions can also help the students in improving their critical thinking skills and in turn can react to challenges in a more holistic approach. Also it would be better to have the results of each module of the test without merging several ones together to make it easier to know where the deficiency lies. Extracting the result of each module in each of the international or local questions will make it easier to figure out the weakness pattern of students in each module whether in the international context or the local ones. In turn, proper interventions can be carried out to alleviate this weakness.

5.4. Directions for further research

More research is needed in this field especially in Egypt. More assessment of sustainability literacy of not only students but staff in all educational institutions not only those of the higher education are needed. This study can be used as a basis for further initiatives to assess sustainability literacy. It would be interesting to measure the sustainability literacy in other universities public and private and compare between them with AUC. Comparisons between AUC and other Egyptian universities whether private such as the German University in Cairo and Nile University or public such as Cairo University and Zagazig University and others will provide a clearer outlook on the problems we face in Egypt and the factors affecting sustainability literacy.

Also, measuring the effect of stronger interventions will help in finding more ways to elevate sustainability literacy. These interventions can be in the shape of orientation sessions on the topic or workshops organized for a group of students and measuring its impact.

More in depth studies on the factors affecting sustainability literacy are needed, such as how media can affect sustainability literacy and what are the best channels to use in doing so. Other studies can be carried out to measure the effect of curricula on the students' sustainability literacy. Community based learning and the effect of student activities on sustainability literacy will also help in devising an all-inclusive, well founded plan on how to achieve the goal of sustainability literacy. Also, the sustainability literacy of those in the civil society and governmental position could be measured to assess the level of awareness and alignment of those organizations with sustainability. In doing so, these institutions will become aligned with sustainability and know their deficiencies and work on it, thus taking the first step in improving community work and reform programs as a whole.

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APPENDICES

A. Sustainability Literacy Test: Core Subjects & Subjects Reference

	CORE SUBJECTS	SUBJECT	TOPICS ISSUES	
Core subjects and issues of sustainable development	Founding principles of sustainable development	SD-DEF	Basic definitions	
		SD-G	Governance (international and national institutions)	
		SD-DEMO	Demography (figures/age pyramid/urbanization)	
	Trends and key figures of global/local issues	Environment	SD-ENV1	Stake 1 : Biodiversity
			SD-ENV2	Stake 2 : Climate
			SD-ENV3	Stake 3 : Pollution
			SD-ENV4	Stake 4 : Energy & Resource
		Social	SD-SOC1	Stake 1 : Fundamental Rights
			SD-SOC2	Stake 2 : Health & Basic needs (including education & Equal opportunities)
			SD-SOC3	Stake 3 : Inequality & poverty
			SD-SOC4	Stake 4 : wellbeing and social progress
			SD-SOC5	Stake 5 : Cultural diversity & heritage preservation
		Economy	SD-ECO1	Stake 1 : Economic Growth & development
			SD-ECO2	Stake 2 : Global finance (financialization of the economy, short term), debt
			SD-ECO3	Stake 3 : Green economy, circular economy, resource dependency
			SD-ECO4	Stake 4 : Taxation (tax havens) and corruption
			SD-ECO5	Stake 5 : underground economy (Black market, criminal activity)
			SD-ECO6	Stake 6 : prosperity indicators
Core subjects and issues of social responsibility addressed in ISO 26000	Organizational governance	SR-GOV	For instance : Values, stakeholder engagement, diagnostic and strategy, decision making process, control and continuous improvement, accountability and reporting	
	Human rights	SR-HR1	Issue 1 : Due diligence	
		SR-HR2	Issue 2 : Human rights risk situations	
		SR-HR3	Issue 3 : Avoidance of complicity	
		SR-HR4	Issue 4 : Resolving grievances	
		SR-HR5	Issue 5 : Discrimination and vulnerable groups	
		SR-HR6	Issue 6 : Civil and political rights	
		SR-HR7	Issue 7 : Economic, social and cultural rights	
		SR-HR8	Issue 8 : Fundamental principles and rights at work	

Core subjects and issues of social responsibility addressed in ISO 26000	CORE SUBJECTS	SUBJECT REF.	TOPICS/ISSUES
	Labor practices	SR-LP1	Issue 1 : Employment and employment relationships
		SR-LP2	Issue 2 : Conditions of work and social protection
		SR-LP3	Issue 3 : Social dialogue
		SR-LP4	Issue 4 : Health and safety at work
		SR-LP5	Issue 5 : Human development and training in the workplace
	Environment	SR-ENV1	Issue 1 : Prevention of pollution
		SR-ENV2	Issue 2 : Sustainable resource use
		SR-ENV3	Issue 3 : Climate change mitigation and adaptation
		SR-ENV4	Issue 4 : Protection of the environment, biodiversity and restoration of natural habitats
Fair operating practices	SR-FAIR1	Issue 1 : Anti-corruption	
	SR-FAIR2	Issue 2 : Responsible political involvement	
	SR-FAIR3	Issue 3 : Fair competition	
	SR-FAIR4	Issue 4 : Promoting social responsibility in the value chain	
	SR-FAIR5	Issue 5 : Respect for property rights	
Consumer issues	SR-CONS1	Issue 1 : Fair marketing, factual and unbiased information and fair contractual practices	
	SR-CONS2	Issue 2 : Protecting consumers' health and safety	
	SR-CONS3	Issue 3 : Sustainable consumption	
	SR-CONS4	Issue 4 : Consumer service, support, and complaint and dispute resolution	
	SR-CONS5	Issue 5 : Consumer data protection and privacy	
	SR-CONS6	Issue 6 : Access to essential services	
	SR-CONS7	Issue 7 : Education and awareness	
Community involvement and development	SR-COMMU1	Issue 1 : Community involvement	
	SR-COMMU2	Issue 2 : Education and culture	
	SR-COMMU3	Issue 3 : Employment creation and skills development	
	SR-COMMU4	Issue 4 : Technology development and access	
	SR-COMMU5	Issue 5 : Wealth and income creation	
	SR-COMMU6	Issue 6 : Health	
	SR-COMMU7	Issue 7 : Social investment	

B. Sustainability Literacy Test: Accompanying questionnaire

1. Student ID number:
2. Age:
3. Gender:
4. City of residence:
5. Secondary Education:
 - Thanaweya Amma (Public school)
 - Thanweya Amma (Private school)
 - IGCSE
 - American Diploma
 - French Diploma
 - Others, Please specify
6. Higher education:
 - Public University
 - Private University
 - Abroad
 - Other, please specify
7. What are the job(s) of the people who raised you (i.e. Parents, guardians...)
 - a. Person 1
 - b. Person 2
8. How would you describe your family's economic background?
 - Lower Income
 - Middle Income
 - Higher Income
 - Other
9. What degree are you pursuing?
 - Undergraduate Degree
 - Graduate degree (Master)
 - Doctorate Degree
 - Other
10. At what stage are you in your graduate or undergraduate studies?
 - Just started (1st year)
 - About to graduate (Final Year)
 - Somewhere in between a and b
 - other
11. Major (or program of study)

12. Are you involved in sustainability/sustainable development (job, volunteer activities, etc.)?
- Yes
 - No
13. If you answered yes in question 6, please write down those activities
14. How interested are you in sustainability/sustainable development?
- Not at all
 - Occasionally interested
 - Often Interested
 - Always Interested
15. Do you keep up with the news about sustainability/sustainable development? (Select the closest answer)
- Never
 - Rarely
 - Often
 - Try to all the time
16. Is sustainability/sustainable development included in your college's/university's curriculum?
- Not at all
 - In dedicated courses on the topic
 - In related courses (in which sustainability/sustainable development is not the main topic)
 - Don't know
17. If your answer in question 9 was b or c, can you please name these courses?
18. Are you interested in implementing sustainability/sustainable development ideas and practices in your job?
- Yes
 - No
19. Do you think you will be able to follow sustainability/sustainable development principles in your future job(s)?
- Yes
 - No
20. In your opinion, is it useful to assess the sustainability, knowledge of students, such as through the Sustainability Literacy Test, and provide feedback to educators?
- Yes
 - No

21. After taking the test and knowing your score, in your opinion, which factors contributed to you scoring high in some areas/or even the whole test?

- Your secondary education
- Your higher education
- Your line of work
- Personal interest in the subject
- Parents' influence
- Friends influence
- Non-degree education (Training course for personal development)
- Other, please specify

22. In your opinion, which of the following efforts can work best in improving your sustainability literacy?

- More Media coverage on sustainability/ sustainable development
- Injecting sustainability into school curricula in all education stages
- Injecting sustainable development in the higher education curricula
- The government and civil society should raise the public's awareness in regards to sustainability
- Others, please specify

23. Do you believe your major affected your answers?

- Yes
- No

24. Is there anything you would like to add that will help us in our study?

C. Professors' Interview questions

1. After reviewing the results of the sustainability literacy test, what is your feedback?
2. What do you think are the reasons behind those scores?
3. The students in your school were able to score high in certain areas and low in others. Why do you think that is?
4. In your opinion, what are the factors that can improve sustainability literacy?
5. Do you believe sustainability literacy an important part of the students' knowledge/ education? If not, please provide reasons for your answer?
6. What measures do you take to improve the students' sustainability literacy?
7. How can we improve the students' sustainability literacy? In your opinion, what other interventions could have help improve sustainability literacy?
8. Is there anything you would like to add that will help us in our study?

D. Consent Form: Students



Documentation of Informed Consent for Participation in Research Study

Project Title: Assessing Sustainability literacy in Egyptian University students

Principal Investigator: Yomna El- Awamri

Phone: 01004848308

Email: yomna.elawamri@aucegypt.edu

*You are being asked to participate in a research study. The purpose of the research is to study the sustainable literacy levels of Egyptian students enrolled in higher education institutions. The sustainable literacy test is the basis for this study. It seeks to determine the weakness patterns in the sustainable knowledge of students in comparison to their majors and backgrounds. It also seeks to determine whether the test can be used as a learning tool to improve the sustainable literacy of students in the American University in Cairo. This will provide insight on how to tackle the problem of sustainable literacy in Egypt and what steps would be suitable to help alleviate this problem. The findings of this research may be *published, presented, or both*. The expected duration of your participation is one month.

The procedures of the research will be as follows: you will take the sustainability literacy test, which takes thirty minutes to complete. If you choose to be part of the interventions, you will use the test in the learning mode for a period of 3 weeks where you will have access to the test from your home and you can research and find the answers for the questions. After the three weeks are done, you will retake the test. If you choose the second intervention, you will be part of a sustainability literacy workshop where you will be informed about the major issues in sustainable development before you take the test. After taking the test, you will fill in a questionnaire that asks questions regarding how you got your score and which factors contributed to your results. After the results are analyzed they will be presented to different professors at the university from your major and others as well. Those professors will be interviewed to get their feedback about the results.

*There *will be* certain risks or discomforts associated with this research. You might not feel comfortable with sharing personal information on how you got your score at the test. In that case, you can refuse to divulge with said information. Your professors will not have access to your answers and will not be able to identify who took the test unless you chose to inform them.

*There *will be* benefits to you from this research. You will get to assess your sustainability literacy and improve it using the test in learning mode. If you choose the second intervention, you will also benefit from a workshop on sustainability; thus, improving your knowledge.

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

*Questions about the research, your rights, or research-related injuries should be directed to Yomna El-Awamri at 01004848308.

*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 _____

E. Consent Form: Professors



Documentation of Informed Consent for Participation in Research Study

Project Title: Assessing Sustainability literacy in Egyptian University students

Principal Investigator: Yomna El- Awamri

Phone: 01004848308

Email: yomna.elawamri@aucegypt.edu

*You are being asked to participate in a research study. The purpose of the research is to study the sustainable literacy levels of Egyptian students enrolled in higher education institutions. The sustainable literacy test is the basis for this study. It seeks to determine the weakness patterns in the sustainable knowledge of students in comparison to their majors and backgrounds. It also seeks to determine whether the test can be used as a learning tool to improve the sustainable literacy of students in the American University in Cairo. This will provide insight on how to tackle the problem of sustainable literacy in Egypt and what steps would be suitable to help alleviate this problem. The findings of this research may be *published, presented, or both*. The expected duration of your participation is one month.

The procedures of the research will be as follows: Students will take the sustainability literacy test, which takes thirty minutes to complete. If they choose to be part of the interventions, they will use the test in the learning mode for a period of 3 weeks where you will have access to the test from your home and you can research and find the answers for the questions. After the three weeks are done, they will retake the test. If they choose the second intervention, they will be part of a sustainability literacy workshop where they will be informed about the major issues in sustainable development before you take the test. After taking the test, they will fill in a questionnaire that asks questions regarding how they got their score and which factors contributed to their results. After the results are analyzed they will be presented to you as a professor and you will be interviewed to get your feedback in regards to them.

*There *will be* certain risks or discomforts associated with this research. You might not feel comfortable with sharing information on your class or how they got their scores. In that case you can refuse to divulge with said information.

*There *will be* benefits to you from this research. You will get to assess your students' sustainability literacy and improve it in future courses. *The information you provide for purposes of this research is *not anonymous or confidential*.

*Questions about the research, your rights, or research-related injuries should be directed to Yomna El-Awamri at 01004848308.

*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 _____

F. IRB Approval Letter

CASE #2014-2015-83



To: Yomna El-Awamri
Cc: Hakan Uraz
From: Atta Gebril, Chair of the IRB
Date: Feb 4, 2015
Re: Approval of study

This is to inform you that I reviewed your revised research proposal entitled "Assessing Sustainability literacy in Egyptian University Students," and determined that it required consultation with the IRB under the "expedited" heading. 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 government agency responsible for approving some types of off-campus research. CAPMAS issues are handled at AUC by the office of the University Counsellor, Dr. Amr Salama. 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.

A handwritten signature in black ink that reads "Atta Gebril".

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



Institutional Review Board
The American University in Cairo
AUC Avenue, P.O. Box 74
New Cairo 11835, Egypt.
tel 20.2.2615.1000
fax 20.2.27957565
Email: aucirb@aucegypt.edu

G. Statistical Tests reports

Phase 1: Sustainability Literacy Test statistical test report

T-Test- To compare the mean total score in AUC with the Global mean total score

H₀: Mean < / = 51

H₁: Mean > 51

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Total Score	206	.376	.1155	.0080

One-Sample Test

	Test Value = 51					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Total Score	-6292.306	205	.000	-50.6238	-50.640	-50.608

T-Test- To compare the international mean score in AUC with the Global international mean score

H₀: Mean < / = 52

H₁: Mean > 52

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Total Inter/supra national	206	.432	.1359	.0095

One-Sample Test

	Test Value = 52				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Total Inter/supra national	-5447.123	205	.000	-51.5684	-51.587

One-Sample Test

	Test Value = 52
	95% Confidence Interval of the Difference
	Upper
Total Inter/supra national	-51.550

T-Test: to compare AUC with the global score in the founding principles

H₀: mean ≤ 64

H₁: mean > 64

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Founding principles of sustainable development	206	.542	.2261	.0158

One-Sample Test

	Test Value = 64				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Founding principles of sustainable development	-4027.740	205	.000	-63.4578	-63.489

One-Sample Test

	Test Value = 64
	95% Confidence Interval of the Difference
	Upper
Founding principles of sustainable development	-63.427

T-Test for comparing AUC with the global score in the environment

H₀: mean ≤ 35

H₁: mean > 35

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Environment : Trends and key figures of global/local issues	206	.282	.1624	.0113

One-Sample Test

	Test Value = 35				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Environment : Trends and key figures of global/local issues	-3069.202	205	.000	-34.7180	-34.740

One-Sample Test

	Test Value = 35
	95% Confidence Interval of the Difference
	Upper
Environment : Trends and key figures of global/local issues	-34.696

T-Test for comparing AUC with the global score in the social module

H₀: Mean < / = 45

H₁: Mean > 45

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Social : Trends and key figures of global/local issues	206	.386	.1764	.0123

One-Sample Test

	Test Value = 45				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Social : Trends and key figures of global/local issues	-3629.120	205	.000	-44.6136	-44.638

One-Sample Test

	Test Value = 45
	95% Confidence Interval of the Difference
	Upper
Social : Trends and key figures of global/local issues	-44.589

T-Test to Compare AUC with the global score in the economic module

H₀: mean < / = 60

H₁: mean > 60

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Economy : Trends and key figures of global/local issues	206	.523	.2060	.0144

One-Sample Test

	Test Value = 60				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Economy : Trends and key figures of global/local issues	-4143.165	205	.000	-59.4772	-59.505

One-Sample Test

	Test Value = 60
	95% Confidence Interval of the Difference
	Upper
Economy : Trends and key figures of global/local issues	-59.449

T-Test to Compare AUC with the global score in the organizational governance

H₀: mean < / = 54

H₁: mean > 54

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Organizational governance	206	.330	.2473	.0172

One-Sample Test

	Test Value = 54				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Organizational governance	-3115.351	205	.000	-53.6699	-53.704

One-Sample Test

	Test Value = 54
	95% Confidence Interval of the Difference
	Upper
Organizational governance	-53.636

T-Test to Compare AUC with the global score in the human right

H₀: mean < / = 54

H₁: mean > 54

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Human rights & Community involvement and development	206	.386	.1659	.0116

One-Sample Test

	Test Value = 54				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Human rights & Community involvement and development	-4638.432	205	.000	-53.6136	-53.636

One-Sample Test

	Test Value = 54
	95% Confidence Interval of the Difference
	Upper
Human rights & Community involvement and development	-53.591

T-Test to compare AUC with the global score in the environment

H₀: mean <= 60

H₁: mean >= 60

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Environment	206	.327	.2610	.0182

One-Sample Test

	Test Value = 61					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Environment	-3336.694	205	.000	-60.6733	-60.709	-60.637

T-Test to compare AUC with the global score in the fair operating practices, labor practices and consumer issues

H₀: mean < / = 63

H₁: mean > 63

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Fair operating practices & Labour practices & Consumer issues	206	.363	.2231	.0155

One-Sample Test

	Test Value = 63				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
Fair operating practices & Labour practices & Consumer issues	-4030.407	205	.000	-62.6369	-62.668

One-Sample Test

	Test Value = 63
	95% Confidence Interval of the Difference
	Upper
Fair operating practices & Labour practices & Consumer issues	-62.606

One Way ANOVA to compare the significance of the difference among different majors

Report

Total Score

Major	Mean	N	Std. Deviation
Sustainable Development	.474	23	.1322
Business undergraduate	.373	82	.0903
Business Graduate	.422	36	.0832
Engineering Undergraduate	.304	24	.1122
Engineering Graduate	.291	22	.1411
GAPP	.374	19	.0933
Total	.376	206	.1155

ANOVA

Total Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.581	5	.116	10.804	.000
Within Groups	2.152	200	.011		
Total	2.733	205			

Report

Total Inter/supra national

Major	Mean	N	Std. Deviation
Sustainable Development	.535	23	.1301
Business undergraduate	.429	82	.1202
Business Graduate	.483	36	.1000
Engineering Undergraduate	.367	24	.1373
Engineering Graduate	.345	22	.1654
GAPP	.400	19	.1202
Total	.432	206	.1359

ANOVA

Total Inter/supra national

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.625	5	.125	7.913	.000
Within Groups	3.160	200	.016		
Total	3.785	205			

Report

Total Local

Major	Mean	N	Std. Deviation
Sustainable Development	.396	23	.1692
Business undergraduate	.285	82	.1020
Business Graduate	.350	36	.0941
Engineering Undergraduate	.238	24	.1313
Engineering Graduate	.218	22	.1790
GAPP	.321	19	.1398
Total	.300	206	.1356

ANOVA

Total Local

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.567	5	.113	7.087	.000
Within Groups	3.203	200	.016		
Total	3.770	205			

Report

Founding principles of sustainable development

Major	Mean	N	Std. Deviation
Sustainable Development	.678	23	.1476
Business undergraduate	.527	82	.2097
Business Graduate	.539	36	.2088
Engineering Undergraduate	.479	24	.2206
Engineering Graduate	.564	22	.2735
GAPP	.505	19	.3027
Total	.542	206	.2261

ANOVA

Founding principles of sustainable development

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.577	5	.115	2.330	.044
Within Groups	9.906	200	.050		
Total	10.483	205			

Report

Environment : Trends and key figures of global/local issues

Major	Mean	N	Std. Deviation
Sustainable Development	.387	23	.1325
Business undergraduate	.276	82	.1552
Business Graduate	.350	36	.1464
Engineering Undergraduate	.183	24	.1579
Engineering Graduate	.250	22	.1683
GAPP	.216	19	.1463
Total	.282	206	.1624

ANOVA

Environment : Trends and key figures of global/local issues

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.763	5	.153	6.573	.000
Within Groups	4.641	200	.023		
Total	5.404	205			

Report

Social : Trends and key figures of global/local issues

Major	Mean	N	Std. Deviation
Sustainable Development	.461	23	.1924
Business undergraduate	.384	82	.1535
Business Graduate	.442	36	.1857
Engineering Undergraduate	.337	24	.1907
Engineering Graduate	.291	22	.1875
GAPP	.374	19	.1447
Total	.386	206	.1764

ANOVA

Social : Trends and key figures of global/local issues

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.499	5	.100	3.393	.006
Within Groups	5.883	200	.029		
Total	6.382	205			

Report

Economy : Trends and key figures of global/local issues

Major	Mean	N	Std. Deviation
Sustainable Development	.561	23	.1751
Business undergraduate	.545	82	.2300
Business Graduate	.458	36	.1795
Engineering Undergraduate	.450	24	.1978
Engineering Graduate	.573	22	.2074
GAPP	.537	19	.1499
Total	.523	206	.2060

ANOVA

Economy : Trends and key figures of global/local issues

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.410	5	.082	1.976	.084
Within Groups	8.293	200	.041		
Total	8.703	205			

Report

Organizational governance

Major	Mean	N	Std. Deviation
Sustainable Development	.448	23	.2952
Business undergraduate	.330	82	.2433
Business Graduate	.333	36	.2056
Engineering Undergraduate	.258	24	.2552
Engineering Graduate	.164	22	.1529
GAPP	.463	19	.2314
Total	.330	206	.2473

ANOVA

Organizational governance

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.389	5	.278	4.985	.000
Within Groups	11.145	200	.056		
Total	12.533	205			

Report

Human rights & Community involvement and development

Major	Mean	N	Std. Deviation
Sustainable Development	.457	23	.1805
Business undergraduate	.376	82	.1470
Business Graduate	.489	36	.1237
Engineering Undergraduate	.317	24	.1523
Engineering Graduate	.236	22	.1649
GAPP	.416	19	.1500
Total	.386	206	.1659

ANOVA

Human rights & Community involvement and development

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.129	5	.226	10.008	.000
Within Groups	4.513	200	.023		
Total	5.642	205			

Report

Environment

Major	Mean	N	Std. Deviation
Sustainable Development	.504	23	.2325
Business undergraduate	.322	82	.2424
Business Graduate	.308	36	.2568
Engineering Undergraduate	.196	24	.2528
Engineering Graduate	.359	22	.3018
GAPP	.295	19	.2505
Total	.327	206	.2610

ANOVA

Environment

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.193	5	.239	3.738	.003
Within Groups	12.770	200	.064		
Total	13.963	205			

Report

Fair operating practices & Labour practices & Consumer issues

Major	Mean	N	Std. Deviation
Sustainable Development	.478	23	.2795
Business undergraduate	.407	82	.2113
Business Graduate	.358	36	.2116
Engineering Undergraduate	.254	24	.1793
Engineering Graduate	.250	22	.2263
GAPP	.311	19	.1487
Total	.363	206	.2231

ANOVA

Fair operating practices & Labour practices & Consumer issues

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.085	5	.217	4.761	.000
Within Groups	9.115	200	.046		
Total	10.200	205			

T-Test to compare the total scores between undergraduate & graduate students in the business school

Group Statistics

Major	N	Mean	Std. Deviation	Std. Error Mean
Total Score Business undergraduate	82	.373	.0903	.0100
Business Graduate	36	.422	.0832	.0139

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Total Score Equal variances assumed	.944	.333	-2.780	116
Equal variances not assumed			-2.872	72.249

Independent Samples Test

	t-test for Equality of Means			
	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
				Lower
Total Score Equal variances assumed	.006	-.0491	.0176	-.0840
Equal variances not assumed	.005	-.0491	.0171	-.0831

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total Score	Equal variances assumed	-.0141
	Equal variances not assumed	-.0150

T-Test to compare between the total scores of undergraduates engineering & Graduate students

Group Statistics

Major	N	Mean	Std. Deviation	Std. Error Mean
Engineering Undergraduate	24	.304	.1122	.0229
Engineering Graduate	22	.291	.1411	.0301

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Equal variances assumed	3.465	.069	.354	44
Equal variances not assumed			.351	40.098

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
					Lower
Total Score	Equal variances assumed	.725	.0133	.0374	-.0622
	Equal variances not assumed	.728	.0133	.0378	-.0632

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total Score	Equal variances assumed	.0887
	Equal variances not assumed	.0897

Phase 2: Follow up questionnaire

Pearson Correlation test to measure the relationship between age & total score

Correlations

		Total	Age
Total	Pearson Correlation	1	.239*
	Sig. (2-tailed)		.018
	N	97	97
Age	Pearson Correlation	.239*	1
	Sig. (2-tailed)	.018	
	N	97	97

One way ANOVA test to compare between total scores by the field of study

ANOVA

Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.421	5	.084	5.526	.000
Within Groups	1.385	91	.015		
Total	1.806	96			

One way ANOVA to see the effect of mother's job on the scores

ANOVA

Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.088	9	.010	.496	.873
Within Groups	1.718	87	.020		
Total	1.806	96			

One way ANOVA to see the effect of father's job on the scores

ANOVA

Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.070	7	.010	.512	.823
Within Groups	1.736	89	.020		
Total	1.806	96			

ANOVA test to compare between total scores of students studying sustainability related courses and those not

ANOVA

Total

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.064	2	.032	1.720	.185
Within Groups	1.742	94	.019		
Total	1.806	96			

T-Test to see the effect of Gender on scores

Group Statistics

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	47	.373900	.1489990	.0217337
Female	50	.349600	.1254048	.0177349

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Equal variances assumed	.669	.415	.871	95
Equal variances not assumed			.866	90.137

Independent Samples Test

	t-test for Equality of Means			
	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
				Lower
Equal variances assumed	.386	.0243000	.0279022	-.0310928
Equal variances not assumed	.389	.0243000	.0280514	-.0314279

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	.0796928
	Equal variances not assumed	.0800279

T-Test: to see the effect of secondary education system

Group Statistics

Secondary education system		N	Mean	Std. Deviation	Std. Error Mean
Total	National System	47	.354751	.1455289	.0212276
	International System	50	.367600	.1299852	.0183827

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	Df
Total	Equal variances assumed	.083	.774	-.459	95
	Equal variances not assumed			-.458	92.190

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
					Lower
Total	Equal variances assumed	.647	-.0128489	.0279823	-.0684008
	Equal variances not assumed	.648	-.0128489	.0280808	-.0686183

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	.0427029
	Equal variances not assumed	.0429205

T-Test to see the effect of interest over the scores

Group Statistics

How interested are you in sustainability/sustainable development?		N	Mean	Std. Deviation	Std. Error Mean
Total	Not Always interested	73	.325114	.1144958	.0134007
	Always Interested	24	.471667	.1436078	.0293138

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Total	Equal variances assumed	.597	.442	-5.098	95
	Equal variances not assumed			-4.547	33.155

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
					Lower
Total	Equal variances assumed	.000	-.1465530	.0287492	-.2036274
	Equal variances not assumed	.000	-.1465530	.0322316	-.2121171

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	-.0894786
	Equal variances not assumed	-.0809889

T-Test to see the impact of degree pursued on the total scores

Group Statistics

What degree are you currently pursuing?	N	Mean	Std. Deviation	Std. Error Mean
Total Undergraduate	50	.333200	.1144720	.0161888
Graduate	47	.391347	.1533772	.0223724

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Total Equal variances assumed	3.091	.082	-2.124	95
Equal variances not assumed			-2.106	84.925

Independent Samples Test

	t-test for Equality of Means			
	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
				Lower
Total Equal variances assumed	.036	-.0581468	.0273707	-.1124846
Equal variances not assumed	.038	-.0581468	.0276152	-.1130539

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	-.0038091
	Equal variances not assumed	-.0032397

T-Test to see the impact of economic background on the total scores.

Group Statistics

How would you describe your family's economic background?	N	Mean	Std. Deviation	Std. Error Mean
Total Higher Income	26	.357692	.1328249	.0260491
Middle Income	71	.362723	.1396213	.0165700

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means	
	F	Sig.	t	df
Total Equal variances assumed	.014	.907	-.159	95
Equal variances not assumed			-.163	46.600

Independent Samples Test

	t-test for Equality of Means			
	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
				Lower
Total Equal variances assumed	.874	-.0050302	.0316027	-.0677696
Equal variances not assumed	.871	-.0050302	.0308727	-.0671521

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	.0577092
	Equal variances not assumed	.0570916

T-Test to see the effect of being involved in activities on scores

Group Statistics

Are you involved in sustainability/sustainable development?		N	Mean	Std. Deviation	Std. Error Mean
Total	Yes	22	.426364	.1500966	.0320007
	No	75	.342311	.1280226	.0147828

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Total	Equal variances assumed	.812	.370	2.602	95
	Equal variances not assumed			2.384	30.525

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
					Lower
Total	Equal variances assumed	.011	.0840530	.0323002	.0199290
	Equal variances not assumed	.024	.0840530	.0352502	.0121143

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	.1481769
	Equal variances not assumed	.1559916

T-Test to compare the impact of following up the news related to sustainability

Group Statistics

Do you keep up with the news about sustainability/sustainable development?		N	Mean	Std. Deviation	Std. Error Mean
Total	No Always	57	.319532	.1203688	.0159432
	Always	40	.421000	.1389300	.0219668

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F	Sig.	t	df
Total	Equal variances assumed	.539	.465	-3.834	95
	Equal variances not assumed			-3.738	76.187

Independent Samples Test

		t-test for Equality of Means			
		Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
					Lower
Total	Equal variances assumed	.000	-.1014684	.0264662	-.1540106
	Equal variances not assumed	.000	-.1014684	.0271427	-.1555256

Independent Samples Test

		t-test for Equality of Means
		95% Confidence Interval of the Difference
		Upper
Total	Equal variances assumed	-.0489263
	Equal variances not assumed	-.0474112

Phase three: Business Ethics & Environment Course

T-Test

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
TOTAL	27	-.015	.1537	.0296
Total Inter/supranational	27	-.007	.2093	.0403
Total Local	27	-.026	.1289	.0248
Founding principles of sustainable development	27	-.022	.2806	.0540
Environment : Trends and key figures of global/local issues	27	.037	.2133	.0411
Social : Trends and key figures of global/local issues	27	-.052	.2779	.0535
Economy : Trends and key figures of global/local issues	27	-.063	.3272	.0630
Organizational governance	27	-.063	.4059	.0781
Human rights & Community Involvement and development	27	-.033	.2000	.0385
Environmental	27	.141	.2664	.0513
Fair operating practices & Labour practices & Consumer issues	27	-.037	.3176	.0611

One-Sample Test

	Test Value = 0				
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference
					Lower
TOTAL	-.501	26	.621	-.0148	-.076
Total Inter/supranational	-.184	26	.855	-.0074	-.090
Total Local	-1.045	26	.306	-.0259	-.077
Founding principles of sustainable development	-.412	26	.684	-.0222	-.133
Environment : Trends and key figures of global/local issues	.902	26	.375	.0370	-.047
Social : Trends and key figures of global/local issues	-.970	26	.341	-.0519	-.162
Economy : Trends and key figures of global/local issues	-1.000	26	.327	-.0630	-.192
Organizational governance	-.806	26	.428	-.0630	-.224
Human rights & Community Involvement and development	-.866	26	.394	-.0333	-.112
Environmental	2.745	26	.011	.1407	.035
Fair operating practices & Labour practices & Consumer issues	-.606	26	.550	-.0370	-.163

One-Sample Test

	Test Value = 0
	95% Confidence Interval of the Difference
	Upper
TOTAL	.046
Total Inter/supranational	.075
Total Local	.025
Founding principles of sustainable development	.089
Environment : Trends and key figures of global/local issues	.121
Social : Trends and key figures of global/local issues	.058
Economy : Trends and key figures of global/local issues	.066
Organizational governance	.098
Human rights & Community Involvement and development	.046
Environmental	.246
Fair operating practices; Labour practices & Consumer issues	.089

H. Transcripts of Professors' interviews

1. Interview with Representative of the Center for sustainable development

After reviewing the results of the test, what is your feedback?

It [the result] is related to the educational system in Egypt, as it doesn't tackle the issues of the three pillars of sustainable development and the worst thing is that it is not on the agenda, it's very clear that the policy makers in Egypt lack the awareness that sustainability is an important part of the education system and has to be considered seriously.

To prove what I am saying the UNESCO decade for sustainable development was from 2005 to 2014. The closing event in December 2014, this huge event where all countries had delegations and representatives but Egypt didn't have one, which means ESD is not on the Agenda.

It's a sad story and now we see the results and it is not a surprise even after choosing the best students. We selected the top students for this master's programs, in terms of the interview process or their GPA. Even after all that we found it very hard to deliver the curricula content. I started the semester with specific learning outcomes but had to reduce them to provide basic shallow knowledge to the students.

I expected them coming from school with more knowledge. I'll give you an example; Ask anyone here about the ten Nile basin countries and very few students will be able to answer. They know nothing about water at the graduate level and this is, in itself, a waste of time. Therefore, we give them the basics.

The education system needs to inject sustainable development in curricula. AUC students are below the global standards; imagine if you go to other universities in Egypt the results will be even lower.

I am shocked at engineering students' results, I expected more. I guess I need to see the questions myself and see whether the test is more oriented to certain backgrounds or is it more balanced. In general it's clear that the level is low, from where should it come?!!

Why do you think the scores of the local questions were much lower than the international ones?

We only have a few international programs trying to raise sustainability literacy, that's why the international knowledge is better than the local one. No one is taking care of the national level but from the international level you have material and content coming from outside from all over the world. It's not even a problem of sharing information it's the availability of information. Do you have information, do you intend to share it, upload it, make more programs on the TV? what type awareness is our media raising except for competitions for singers, etc. We don't have this culture in Egypt.

It [sustainability literacy] will not come randomly; somebody should take care of this problem. If you do the test in 5 years the results will be worse and if you go outside of AUC it will be much worse, somebody needs to take care of this issue.

What type of learning techniques are needed to elevate sustainability literacy?

Learning is not about feeding information. It's not about teaching; it's about learning to learn. The students' objective should be learning to learn. The EduCamp, curricula has more dynamic learning techniques such as experiments, interviews, outside the classroom activities. You teach the kids how to learn and teach your family how to reserve water and conserve electricity and they go back and teach others.

Once you do this and it comes from the media, the government, the civil society, from the street, from them, you create this type of awareness. We use more innovative ways of delivering information, community based types of learning, encourage creative thinking. There is no feeding of information but teaching those skills in an indirect way.

Education is one way to improve sustainability literacy but also the contribution of the civil society is needed. They need to interfere in the communities to raise the awareness of the people. Media, the internet and the media nowadays present the worst ethics ever. They need to invest money in other issues.

What about assessment techniques for sustainability literacy? How can you assess the Graduate program for sustainable development?

The level of students' interference in the community is the only way to measure the sustainability literacy. When see I see you doing this research and putting a stone to build something interesting for the country and changing the community. When I see other students interfering in changing the littering habit of Egyptians for example or helping find solutions for the waste problem in Egypt, etc. This is how I measure the success of this project [graduate program for sustainable development].

After two or three years I look for the students and see what they've done, if I saw that they did something based on what they learned, based on something more progressive that came to them indirectly from the program, then I succeeded. If I didn't see this in two years I will not be here in this position, because it will show that I failed.

If I saw those graduates who on paper are supposed to be ambassadors for sustainable development not being ambassadors for SD, then there is no way I can continue. The I can go make another useless TV show and forget about this.

This is why I am very sad and disappointed with the results, I expected more.

According to the feedback from the students, what are the best courses addressing sustainable development?

The sustainability of thermal systems course is very interesting. We recommend it to all students. Energy is very interesting, it is involved in every sector and any one from any background should know about this... He will use in anything; studying energy is becoming a school must and same goes for water.

Dr. Khaled Abdel Halim's courses such as urban planning and sustainable cities. Intervention and prevention to know how to develop interventions and have the skills to interfere correctly in the community. Entrepreneurship and innovation is also very useful.

The results prove that personal interest has a huge impact on sustainability literacy? What do you think of that?

Personal interest comes from a very early stage of their lives. We shouldn't teach the kids math reading and writing this early. We should teach them tangible things, things they can see and feel. We should build their personality, you have to build values. They [experts] talk about higher education to improve sustainability literacy, but for me;, you need to start at a very early stage to build their personalities.

We did this project [Graduate program for sustainable development] because we failed at the university level. We wanted to do a graduate program for water management and then we found that the problem goes back to the undergraduate level, when we examined the undergraduate level we found it goes back to secondary education and then to the primary and so on. Which is why we did EduCamp.

SD is ignored and therefore we need to focus more on it.

Speaking of EduCamp, the ESD school kit seems to be focused on the environment. Is this because the environment is the most ignored dimension of all or are there other reasons behind it?

In a way yes, it's because the environment is ignored and not only environment but we also teach the social issues in an indirect way by teaching values. They're all related. However, it's too early to integrate the economic dimension in curricula and anyway Egypt as a country, was not bad in the economy. In the last three years before the revolution we were also bad in the social side but because human beings can talk we know that there is a problem. But because the environment is not talking, we don't know that we are bad at the environmental part. Read the strategy for sustainable development 2030. They are now focusing more on the social dimension, they have to because of the exclusion of the public in 2010 a revolution happened, they now put means to make citizens happy like creating jobs and so on. On the other hand, the environmental part is not in the equation. They are talking about coal, we must be kidding! Because the environment is not resisting no one is talking about it!!

This is your task as ambassadors; you need to talk for the environment.

What else, the culture of contribution without getting benefit from it it's not there is still a lot to be done on the undergraduate level. We need a reorientation towards sustainability for all disciplines.

What about AUC, some measures were taken to promote sustainability on campus such as greening the New Cairo campus and so on, but what about the education itself?

I proposed a strategy in 2011 for sustainability. It was a long term plan with the objective to convince faculty members to reorient their curricula; I am not sure what happened to it, though.

But the goal is... I don't have to take a master's degree to understand the meaning of sustainability or study a course for sustainability. You cannot have one course for all the schools, you need to find a way, seminars, assignments, have them write reports about sustainability, do more research related to SD and so on.

This should be in the strategic plan for the university. The academic strategic plan of the university to raise the awareness of the faculty. Once they change their perceptions, then it will reach the undergrads, once it reaches them they will be more interested and will talk more about it and it will reach others and others.

But you need to prepare the kids to have the proper personality from the beginning because SD has a lot of ethics, no one is watching you when you cut a tree, it has to come from the heart.

What is positive is that you hear sustainability everywhere, in the economic forum there is a sustainability strategy in Egypt, whether we like it or hate or it's misleading but starting to talk is creating the culture of getting used to the topic and with time you will understand the topic. Talking about sustainability in a misleading way is better than not talking at all.

The new university plan mentioned sustainability... the AUC is moving fast in this direction, we are now preparing for a professional diploma in green community, one for water and others.

2. Interview with Representative of School of Sciences and Engineering

After reviewing the results of the test, what is your feedback?

We started very late in sustainability even in AUC, worldwide interest in sustainability started in 1987, then in 1982 they started the UN decade for sustainable development. Ahmed Nazif, the ex-Prime Minister formed a framework for sustainability but without any action plan whatsoever. Sustainable development was introduced in Egypt very recently.

Right before the revolution, the government tried to introduce the concept of green economy to promote sustainable development but that was in 2011, but because of the revolution it was pushed to 2014 and two or three months ago they started a new initiative for sustainable production and consumption.

In engineering, in 1996 we started working on this and we now have a lot of research and courses... our efforts are mainly focused in mechanical and environmental engineering. Until about a year and a half ago, when the university took the responsibility of promoting SD. When new campus was built, the management rejected the idea of having a sustainable campus; they said it was beyond their capabilities, they can't do it. However, since 2 years ago, we are now starting to make it more sustainable.

We tried to introduce it through some training courses we developed a unit under SSE to teach courses and deliver trainings related to SD and the environment. it was initiated 3 and a half year ago. Through this unit, we try to do consultations, training, awareness initiatives for SD we even organized some conferences.

As one of the founders for the Graduate program for sustainable development, where did the idea come from?

We felt there is a need to introduce a new graduate program across the campus... to not only include science and engineering but also economics, business, humanities, all other disciplines within the same program. This is because we have a strong feeling everybody should work together for the sake of sustainability. It is not a one discipline show. But all schools have to be

involved. Engineers design solutions and business students can turn these solutions into economic gain. But we can't forget the role of humanities and social sciences in setting policies to encourage investment and allow engineers and entrepreneurs to build solutions.

What type of learning techniques are needed to elevate sustainability literacy?

I have a strong belief in injecting sustainability into curricula. I already published 5 books in Arabic for sustainable development and will continue to do more. We have to have books talking about sustainability and teaching sustainability, in English or in Arabic but for Egypt I think Arabic is more important it has more reachability.

We also have to have practical case studies so that eventually we can build sustainable communities in Egypt in mega projects with the corporations. Environment is the key issue here, but a sustainable environment not environment alone... you have to gain money not invest only in development projects. Environment is not linked to engineering or science even it is related to all aspects of life, in humanities, agriculture, even medicine it is a generic term not a monopoly to engineers only. You have to tackle social and economic sustainability to achieve winning integrated solutions.

You have to transform all environmental benefits into economic benefits and you need political science and public policy and sociology to have proper regulations. The economy is a problem also, not only the environment. Seven years ago Columbia university had a problem with sustainability. All around people talked about it but it wasn't tangible. So they got engineers and business majors together to develop solutions by engineers and turn those into profitable business businesses.

What about assessment techniques for sustainability literacy? How can you assess the Graduate program for sustainable development?

This is the first time to do a sustainable development graduate program in Egypt... this is only the second year, it's still very early to have some kind of assessment. We can't do it now we need to continue for a while and then assess. A few years after the graduation of students we can do an exit review and analyze their comments, the pros and cons they see and get their feedback.

We have to wait a year or two to get 30 students and have a representative sample and let them get some experience in this field and judge for themselves... It's too early to assess now.

What are your recommendations on how we can improve sustainability literacy?

Two things, we need to reorient the community services towards sustainability the promotion of sustainable development and encourage more practice of it in the community. This can be done using the Media.

For example, no one knows anything about the sustainable development activities on campus. No one knows what we do. We need media coverage not only on the level of AUC but also on the national level. We have no understanding of the proper concept of sustainable development.

The decision makers and the media need to understand the concept of sustainable development... here in Egypt we only talk without action... Sustainable development needs a champion to adopt this way of thinking, one who has substantial knowledge and a deep understanding of sustainability.

For example: The UNESCO launched the UN decade for ESD and unfortunately, Egypt was at the end of the tail of this initiative. When they concluded this initiative last November at the Nagoya conference and had countries delivering presentations from all around the world about their efforts in ESD, no one was there from Egypt. No one has done anything in this field and this is a sad reality. An Initiative that has a 10 year timeframe and at the end of it you're still asleep not only for a year or two but you're asleep for ten years.

You have to inject it [SD] from the beginning. In Canada they do school trips for students to KG students to sewage system stations. They show him how throwing a toy in the toilet harms their work and how much they can conserve and be able to transform this into water for agriculture. Similarly, we have to have the concept of SD introduced from day one, from primary school.

Yes, our educational system is poor, the educational corruption is considerable. We have to introduce it, not in complicated way but in a sequential way, to make them understand it in an easily and combine it with small projects to provoke action. We did an experiment of this in a

small school here in Egypt for recycling and it was a huge success. Why can't we have that instead of having children watch TV or waste our resources on the talk shows that doesn't produce any outcome.

I genuinely believe in the introduction of SD in all educational stages but we have to introduce the practical side of it. Not in a theoretical way because our educational system is all about memorizing, and this is not sustainable at all.

3. Interview with 2nd Representative of the school of Business

After reviewing the results of the test especially the results of the intervention, what is your feedback?

I'm not surprised even by the negative results; the Business Ethics and Environment course is not focused on sustainability. We talk about externalities and air pollution... we explain what externalities are and how the depletion of resources is not accounted in the cost of corporations but there is not a whole chapter for it. In this case, the course as an intervention was not targeted to improve sustainability literacy. None of the students came to ask about the test or the questions afterwards their interest hasn't improved much after taking the test.

The only incentive for students is something related to their grade. And since that is not the case here then you won't really affect their interest.

You will find students who come from finance or economics scoring higher as they take courses such as economic development and labor economics which has some element of sustainability in them.

What about AUC? What do you think of AUC's commitment to SD?

We are committed, we have taken steps, but there is still a lot to be done. Unless we have a mechanism available to ensure that courses have elements of sustainability and assess afterwards what the students learn from it, we won't go far.

In order to make this work... sustainable development has to be added it into the learning goals of each school and then using suitable measures to regularly asses it. This process ensures that the goal is accomplished and assessed every two years and once we know it has been achieved, we can move on to a bigger one and build on it.

For the school of business unless there is a compulsory course nobody will be interested to take it. So injecting or embedding SD in the curricula is the way to go forward.

As a member of the responsible business taskforce, we provide professors with resources about SD to make it easier for them to embed it into curricula. But this is a very slow process and so far hasn't accounted to much as professors are not obligated to do this so unless they are interested and believe in SD they won't do anything.

What are your recommendations on how we can improve sustainability literacy?

Number one is media and education and also peer influence. But this will only happen if we improve the media and education first.

Also, in the future we can have the students do their projects on sustainability or I can dedicate a chapter on sustainability.

However, you can't guarantee what decision the students will take. I conducted a study on the students' here to test their ethics using case studies. Some of the students, after analyzing the case studies and knowing which decisions are ethical and which are not, they still choose the unethical path. They come to me and say: it is unethical but I will do it anyway, for the sake of the company I will do it.

4. Interview with Representative of School of Global Affairs and Public Policy

The feedback is not surprising to me, that it's low. I've seen the exam I have contributed in the development of the local questions. The exam is pretty much, content based, not competency based and the content is not well integrated into curriculum or into general public opinion. So it doesn't surprise me the level of general awareness, in other disciplines not just in these disciplines you are assessing; is quite modest. And I guess the survey captures it pretty well. It is also pretty intuitive that the Sustainable development students scored higher than others as there is more focus on this theme in their studies.

The public policy and administration result is a bit surprising. But this can be because, within the public policy program, not many courses are very relevant to this content and social and environmental policy course is pretty exclusively the only course I can think of that addresses issues relevant to SD, aside from the urban planning and sustainable cities courses.

But this is not only in public policy but across all the disciplines and even business school. The problem is that SD is still seen as a separate category that needs to be integrated or that there needs to be more courses addressing it. However, what we need is for it to be mainstreamed into the curriculum across these different programs. It needs to have relevance to all these programs. And where this mainstreaming of content into core disciplines can begin to happen, is when the broader literacy will be elevated.

As a contributor to the development of the test, what is your assessment if it especially after knowing the results?

The test goes to quite great detail, which is not at all the popular level of knowledge in Egypt. So perhaps, what it's measuring needs to be more competencies than content driven. And the reality within the general Egyptian society is a lower level of familiarity with these concepts on all level not just media and public awareness but even at the level of policy making and formal institutions. So it's a combination of both and this content is not at this point integrated into courses or programs where that specificity of content is incorporated.

What type of learning techniques are needed to elevate sustainability literacy?

I try to incorporate more simulation activities more so now in teaching because the competencies and content are absorbed much more effectively... more field based work not just case studies taken in class but to have more field based interdisciplinary visits and projects, particularly when it comes to sustainability, being able to see the reality of these themes and the complexity in applications is going to be the most effective way to elevate the sustainability literacy

Why do you think we haven't scored better at the test?

I think perhaps we need less focus on the content. The test provides a baseline for knowing where to start but the test itself is not going to improve the sustainability literacy. that would come through experience that then might be reflected in another test or another application of the test.

Most of the public policy courses tend to be more technical skills oriented relating to public administration and policy and the tools and measures not necessarily content driven in terms of the particulars of social policy or the environmental policies and it ties back to the idea of mainstreaming, where across all courses even a program for evaluation and assessment, that to imbed case studies and themes whereas the course is now seen as an opportunity to pick up a tool. It would be helpful to see examples of how the tool can be applied in cases that have relevance to sustainability and sustainable development.

This hasn't been identified as priority across departments as an objective... it's not a priority at the public policy program.

What are your recommendations on how we can improve sustainability literacy?

I think there is not, first of all, recognition and second of all priority given to this issue for both management and professors.

The linkages between SD and these issues and the wide range of content addressed by the public policy program has to be established in order for management and professors to see its importance. This step hasn't been achieved. For example: how sustainability can be relevant to a

course on democratization, this mainstreaming in terms of faculty is needed in order to translate into content in the courses. We need to integrate it into formal institutions and policy making so that it becomes more a part of public awareness.

The test is a really good tool for assessing that but we need more oriented course capacities rather than content scenario based examples and see how students respond to these scenarios... see how they are processing these cases, see their problem solving, case examples that allow students to put together plans responses or solutions. It's really important to develop this kind of thinking capabilities not just for them to be familiar with the data that's out there but to actually do interventions themselves.

At AUC, we've already started taking steps towards this and I think we have 5 to ten years to achieve the goal of sustainability literacy here at AUC.