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# THE LEVEL OF ENVIRONMENTAL LITERACY FOR THE UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF BAHRAIN

BY
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2006

# DECLARATION

I declare that this work is the result of my own investigation and that it has not already been accepted in substance for any degree, nor is being currently submitted for any degree.

Signed: ..... Date: 2-11-2006

The Thesis defense committee considers the Thesis titled:

**THE LEVEL OF ENVIRONMENTAL LITERACY FOR THE UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF BAHRAIN**

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# Abstract

## THE LEVEL OF ENVIRONMENTAL LITERACY FOR THE UNDERGRADUATE STUDENTS AT THE UNIVERSITY OF BAHRAIN

**By**

**A.HAMEED S.JAWAD AL-WEDAEI**

This study is about the level of environmental literacy for the undergraduate students at the University of Bahrain which is the leading university in Bahrain.

A survey based on the Wisconsin environmental education framework was constructed to be used as the main instrument for this study. The survey composed of three sections each measuring different aspects of the environmental literacy. The first section measures the different aspects of attitudes of the environmental literacy while the second measures the different aspects of environmental responsible behavior and the third measures the different aspects of the environmental literacy knowledge.

A fourth part which could be called the environmental literacy index was established by adding up the three parts.

The survey was sent to a number of distinguished specialists in the field of the environment and its sciences to establish the validity of the instrument. Where appropriate, their opinions were taken into considerations.

A pilot study has been conducted on a group similar to that of the sample population to establish the reliability of the three parts of the survey.

The group consisted of 38 students and by using Cronbach's alpha to establish the internal consistency; the following results were obtained: The attitude section alpha coefficient was 0.84, the behavior section alpha coefficient was 0.81; and the knowledge section alpha coefficient was 0.73.

These results showed that the instrument is reliable.

The study population was studied and the reliable sample size was determined using smith's formula. The reliable sample size was 391 and the sample size on which the study has been conducted was 402. A representative sample was selected from the undergraduate students of the University of Bahrain and the survey was administered. After collecting the questionnaires, the data were processed using the SPSS for windows version 12.01. The following results were obtained: the students obtained a mean of 34.93 (58.22%) on the attitudes scale, 23.86 (39.76 %) on the behavior scale, 20.31 (33.85%) on the knowledge scale and 79.09 (43.94%) on the environmental literacy index.

The study also found that there was a strong correlation between the knowledge and the attitudes. Using Pearson correlation coefficient, the correlation between the knowledge and

the attitudes was 0. 421. The correlation between the attitudes and behavior was at 0. 312 which can be considered a moderate correlation in social sciences. The correlation between the knowledge and the behavior was weak at 0.021.

In addition the study compared the performance of the different subpopulations at the university and found the following results:

There was no significant difference between the performance of undergraduate students on the attitudes, knowledge and environmental literacy index according to the gender variable. However there was significant difference between males and females in favor of males on the general behavior scale.

In addition the study found no significant difference between the performance of the undergraduate students on the all four scales of the environmental literacy according to age and class standing.

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# Chapter One

## Introduction

Environmental problems threaten the very existence of life on earth. They are diverse, interconnected and complex. Some of these problems such as global warming and ozone depletion are global in nature while others such as noise and waste problems are purely local. Unfortunately most of the environmental problems if not all can be traced back to the development process. Indeed they are seen as a "side effect" for industrial wealth (Brundtland et al,1987). However the process of development can not be stopped or slowed down especially in the developing countries where the youth make up the majority of the population and the need of job opportunities is a priority. How to balance human needs with those of the environment is a problem that must be resolved. There should be a way to guarantee the economic growth, but not on the expense of the environment. A very creative solution comes with the notion of sustainable development. In the influential book "Our Common Future", Brundtland and her colleagues (1987) define the term sustainable development as" development that meets the needs of the present without compromising the ability of future generations to meet their own needs".

They go on to explain that sustainable development has two main concepts" the concept of human needs, in particular the essential needs of the world's poor, to which the overriding priority should be given; and the idea of limitations imposed by the state of technology and social organizations on the environment's ability to meet the present and future generations" (Brundtland,1987).

While her report primary concern was with the development and equity between inter- and intera-generations, it does not ignore the importance of the environmental maintenance to achieve this equality.

Indeed sustainable development has three pillars upon which it stands which are economic, social and environmental.

Sustainable development was the basis for the United Nations Conference for Environment and Development which is popularly known as the earth summit which was held in Rio de Janeiro, Brazil in 1992. One of the most important outcomes of the earth summit was the formulation of Agenda 21. Agenda 21 is "a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United

Nations System, Governments, and Major Groups in every area in which human impacts on the environment." (UNCED, 1992).

Chapter 36 of agenda 21 is devoted to public education, awareness and training and confirms the role of education and the importance of positioning environmental education in the perspective of sustainable development.

Further more, agenda 21 challenges colleges and universities in developing environmentally literate citizenry which is at the heart of sustainable development.

In the kingdom of Bahrain, the University of Bahrain without doubt plays the most important role in higher education. The following discussion is an attempt to explore the environmental culture within this very important national educational institution.

### 1.1 University of Bahrain and the environmental culture

Since the websites reflect the image and the value of the educational institutions and since it is increasingly very important source for information about the educational institutions(Taylor, 1999), the researcher mainly utilized the website of the university of Bahrain(www.uob.edu.bh) to analyze the environmental culture at the university.

According to the university website, the establishment of the University of Bahrain goes back to the late sixties when the higher institutes for males and females were established. In 1968 the Gulf technical college was established by an amiri decree. By the year 1978 the male and females higher institutes were converted into the university college of arts, science and education. Both of the colleges remained independent until the year 1986 when the late Amir of Bahrain sheikh Isa bin Salaman Al-Khalifa (1961-1999) announced the establishment of the University of Bahrain by merging the two colleges.

From organizational point of view, the university is administered by four bodies or councils which are organized in a hierarchal way. On the top of the pyramid is the board of the trustees which is responsible for managing the university, overseeing the colleges' work, supervising the university's activities and ensuring the implementation of decisions which are designed to achieve the goals of the university.

Next in the administrative ladder is the university council which is responsible for implementing the policies dictated by the board of the trustees.

Each college in the university has its own college council which supervises the college's academic programs, ensures the execution of the university board of trustees and the university council decisions. It is also responsible for monitoring the academic departments, dealing with students' matters and to improve the learning standards in the college.

As with the colleges, each department at the college has its own council as well. Among its priorities, the department council discusses the department's academic programs, teaching methods, learning resources, course offerings and student registration.

University of Bahrain composed of eight colleges and several other learning centers. The eight colleges are: the college of arts, the college of science, the college of business, the college of law, the college of education and the college of engineering, the college of information technology and the newly established the college of the applied sciences.

There are twenty three departments and thirty two undergraduate programs spanning different fields and specialization (Appendix E).

There is no doubt that university of Bahrain plays the most important role in the university education in Bahrain. A quick look at the diversity of programs, number of students, and the budget allocated to the university reveals this fact.

University of Bahrain has the most diverse undergraduate programs compared to the rest of the universities in Bahrain. As it is indicated before, university of Bahrain has thirty three undergraduate programs very much exceeding the other universities (Appendix E).

More than 80 % of the university students in Bahrain are students at the University of Bahrain (Appendix D).

According to ministry of finance (ministry of finance, 2006), the budget allocated to the university of Bahrain is BD 32 million for the years 2005-2006(Appendix F).

Despite its importance, the University of Bahrain has not carried out the role that it should play in the field of environmental literacy.

In its mission statement which summarizes the goals and objectives of the university, the University of Bahrain entirely ignores any explicit or implicit mention of the environment or sustainability directly or indirectly as it is the case in a number of universities around the world where the concept of the environment and sustainability has been included in their mission statements such as University of Emory and the Prescott College(Rowe,2002)

In the researcher opinion, the lack of interest in environmental literacy in the university mission statement has influenced the different aspects of the university.

Indeed the university has not signed any agreement such as Talloires Declaration or Copernicus charter that encourage the transfer of the university into an environmentally sustainable institute.

Out of the 32 undergraduate programs administered at the university, only two programs (BA of sociology in society and the development and BA in geography of environment and natural resources) i.e. 6.25% has environmental specialization (Appendix E). Unfortunately even these two majors are not multidesplinary which is one of the criteria for effective environmental education.

There are undergraduate programs which necessitate the students to take environmental related courses. These include: BA in sociology, BA in Geography, Bed in primary education, B.Sc in Civil Engineering and B.Sc in biology (Appendix E). However most of these programs do not require the students to take such courses. Indeed the university requirements of courses do not include any course with environmentally related topics. This means that there is a possibility that an undergraduate student graduates without having exposed to any in-depth environmental course.

There are some environmental activities carried out in the students societies especially those of science and engineering societies. However these activities are not enough and more emphasis and funds should be directed towards the environment in order to have the desire effect on the students' behavior.

The same conclusion can be drawn about the club of the friends of the environment.

Regrettably the lack of interest is not confined to the curricula only but extends to the operations at the university.

Take for example the purchasing guideline followed by the university. It takes a number of criteria in buying goods and services for the university which include the quality, time and cost of delivery and after sale services. Unfortunately the environmental factor is not included in the guideline.

This fact can be generalized to the electricity, transport, water management .....etc.

Indeed the University of Bahrain has a lot to do in order to line itself with the other universities which take the lead in embracing the environment and the sustainability culture.

## 1.2 The problem

With all threats to our environment on which our survival depends, our people can not afford but to be environmentally literate. Environmental education is one of the most important tools in building environmentally literate society.

University education is assigned with the task of providing the society with people working in different professions ranging from school teachers to political leaders.

These students will soon have to take decisions that would affect the environment both directly and indirectly in a very profound way. That is why our university system must take the leadership role in incorporating environmental education and practices in their culture.

As seen from the above discussion, in our country the dominant higher education institute is the University of Bahrain.

Unfortunately no study has been conducted at the university to measure the level of the major components of the environmental literacy.

### 1.3 The purpose of study

The main objective of this study is to determine the environmental literacy level of the undergraduate students at the University of Bahrain through measuring the three major components of the environmental literacy.

The study would compare the environmental literacy performance between the different subpopulations at the university i.e. between the genders, age, college and class standing.

The study also would try to find how the major environmental literacy components are related. This would enable the university to figure out on which component is to concentrate. This study can establish whether the university needs to concentrate further on the integration of the environmental literacy in its curricula both formal and informal or the current level is satisfactory.

Further more results of the study can be used to assess any future progress at the university should the university decide to implement any future programs of environmental literacy.

The researcher would try to explore the environmental culture at the university and to find the models that can be adopted to instill the environmental literacy at the university.

### 1.4 Research questions:

1. What is the existing level of environmental literacy major components among the undergraduate students at the University Of Bahrain?
2. Is there any relationship between the environmental literacy components for the undergraduate students of the University of Bahrain?
3. Is there a measurable difference in the subpopulations (gender, class standing/age) scores on the three sections and total score?

## 1.5 Hypotheses:

**Hypothesis one:**

Since there is no conscious effort on the university part to promote the environmental literacy for its undergraduate students, the level of the environmental literacy components is low.

**Hypothesis two:**

Based on literature review as would be revealed later, the following hypothesis can be made regarding the extent of the correlation between the major environmental literacy components:

The correlation between knowledge and attitudes components is strong.

The correlation between knowledge and behavior components is weak.

The correlation between attitudes and behavior components is moderate.

**Hypothesis three:**

There is a significant difference in the undergraduate subpopulations' performance at the University of Bahrain.

## 1.6 Study outline

This thesis is about measuring the level of environmental literacy of the undergraduate students at the University of Bahrain. To fulfill this goal, a survey based on the Wisconsin environmental education framework has been constructed.

The survey consists of three sections. Each measures one major component of environmental literacy. These components are: a) environmental attitude b) environmental behavior and c) environmental knowledge. A score is generated for each section. By adding the scores of the three sections together, an index of environmental literacy is generated for each student.

A number of experts in the field of environmental studies would be contacted to establish the validity of the instrument.

A pilot study would be conducted to establish the reliability of the study instrument.

The population under study which is the undergraduate students of the University of Bahrain would be examined and a representative sample would be drawn out of it.

The researcher would administer the survey. Then the data generated would be fed and coded in Microsoft excel and then it would be exported to spss 12.0 and different statistical functions would apply to these results in order to answer the questions of the study.

The result would be discussed and a conclusion would be drawn.

## 1.7 The scope:

The population under study in this thesis is the undergraduate students of the University of Bahrain. It includes both sexes males and females, all class standing from the first to the forth years, students in the all seven colleges comprising the university and including all ages whether under or twenty and above.

The subject under study is the environmental literacy major components only which are: environmental knowledge, environmental attitudes and environmental behavior.

## 1.8 Limitations:

The study is limited to the subject under investigation which is the major components of environmental literacy; and population of the study which is the undergraduate students of the University of Bahrain and no generalization could be done beyond it.

Since the attitudes part of question uses the likert-type scale which is a direct method of measuring attitudes, the honesty of the answers can not be guaranteed.

The behavior measured by this study is a self reported and there may be a big difference between it and the observed behavior.

## 1.9 Clarification of terms:

The environment

According to the American heritage dictionary (Pickett et al, 2000), the environment can be defined as" The totality of circumstances surrounding an organism or group of organisms, especially:

a. The combination of external physical conditions that affect and influence the growth, development, and survival of organism.
b. The complex of social and cultural conditions affecting the nature of an individual or community. "

Undergraduate students:

Any student how is registered in a four year program that would lead to a bachelor degree.

Environmental literacy:

There are many definitions for the environmental literacy as would be clear in the literature review. However the operational definition that would be used in this thesis is that of Roth (1992) who believes that environmental literacy is an individual's knowledge about and attitudes toward the environment and environmental issues; and the active involvement in working toward the maintenance of dynamic equilibrium

between the quality of life and quality of environment and the understanding that humans are in fact a part of nature.

# Chapter two

# Literature review

Agenda 21 gives the right of development to societies but not on the expense of the environment and social justice. This is indeed the essence of sustainable development. Agenda 21 focuses on the role of education to promote sustainability; and at the heart of sustainability lays the environmental education and its outcome the environmental literacy.

In this review of literature, the researcher would examine these issues.

## 2.1Sustainable development:

Sustainable development is very important concept which started to appear in the late eighties of the last century. The following discussion would try to shed light on the definition, components, and indicators for the sustainable development and the major challenges facing the kingdom of Bahrain in the field of sustainable development.

### 2.1.1 Definition of sustainable development

There are many definitions for sustainable development. The most quoted definition of the sustainable development is the Brundetland definition which was mentioned in the introduction of this thesis and which goes on to add that sustainable development "requires the promotion of values that encourage consumption standards that are within the bounds of the ecologically possible and to which all people may reasonable aspire [...] at a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soil and living beings"( Brundtland et al, 1987)

Indeed the definition of Brundetland stresses the human needs especially of the poor but at the same time it shows the idea of a sound economy operating within a resilient ecology and providing goods and services which are equitable for current and future generations.

Other important definition is that of the World Conservation Union which states that sustainable development is the "Development which improves the people's quality of life, within the carrying capacity of the earth's life support system"

(IUCN et al 1991, p10). As it is clear from this definition, it emphasizes the ecological perspective of sustainable development.

Unfortunately, these definitions do not show how sustainable development can be carried out. Some definitions try spill out how the sustainable development can be brought about.

The definition of Blowers (1993, p.6) is an example" to promote the development that enhances the natural and built environment in ways that are compatible with:

- The requirement to conserve, even increase overall the stocks of natural assets.
- The need to avoid damaging the regenerative capacity of the world's natural ecosystems
- The need to achieve greater social equality
- The avoidance of passing additional costs and risks to succeeding generation "

The right of development is indisputable, yet this right should be exercised in a wise and thoughtful manner. The wisdom here dictates that the humans should not destroy their homeland the earth in order to squeeze an immediate delight or glee especially when they know that this planet is a very sensitive organism. It is not only the natural environment that they should be careful about but the plight of other people living side by side with them and whom the poverty and disease slaughter them without mercy. Social justice must prevail if this plant and its people are to live and develop sustainably.

### 2.1.2 Components of sustainable development:

The above discussion shows that there are three factors or pillars without which no sustainable development can be carried out.

These pillars are the environment, the economy and the social justice. The needs of the existing and the future generations can not be met without balancing the environmental, economic and social objectives.

It is worth noting that these components should not be viewed independently of each other rather they are interdependent and a harmony between them should be established if humanity wants to pursue equal and sustainable future.

The following diagram represents the three components of sustainable

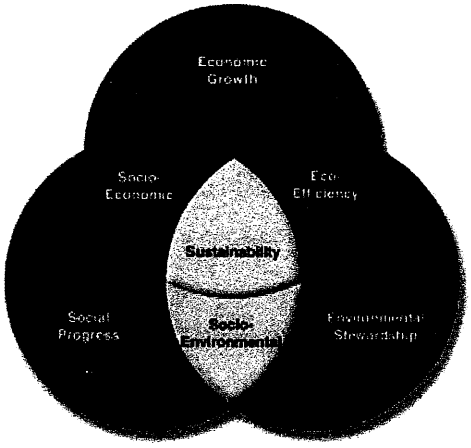



Figure 1. The main components of the sustainable development (Conocophillips, 2005)

**The environment:**

The development and the environment are inseparable; and any development that does not take the environmental issues into consideration is a false one (Anderson, 1991). Environmental issues such as access to clean water and pollution-free air are strongly linked to developmental issues to the extent they are included in many developmental indicators.

Moreover, any economic activity is performed within the sphere of the environment. The economic activities extract their raw materials from the land, soil, forests, rivers and oceans.

In addition to the raw materials derived from the environment, the sources of energy they are renewable or non renewable sources of energy are utilized from the environment.

Not only that, but economic issues such as poverty is one of the most important causes of environmental degradation. The poor around the world are forced to assassinate their forests for fuels and other necessary purposes. Poverty is also one of the main reasons for water contamination and poor water quality due to the lack of infrastructure which treat pollution.

From social point of view, environmental problems and issues affect societies all around the world whether they live in developed or developing countries or whether they live in rural or urban areas. Social issues such as population growth have direct effect on pollution, destruction of habitats, biodiversity, and waste generation.

The society awareness of the environmental problems is a prerequisite to solve local environmental problems such as the waste and the noise problems. There is a need on

behalf of world's societies to join forces in order to solve global environmental problems and issues such as ozone depletion and global worming. In the words of Brundutland, a "multilateralism" approach should be employed if the humanity ever wants to resolve such problems (Brundtland et al,1987).

**Society:**

To achieve sustainable development, the social needs and objectives must be fulfilled and the links to other sustainable development must be clarified.

All people need some basic goods and services in order to achieve a productive life. Education and training are necessary for people to earn their living and to fulfill their potential. Other important social objectives that participate in a sustainable development are gender equality, empowerment and cultural preservations.

Sometimes social issues such as lack of education opportunity may force people to migrate to other countries where they think it is available. This may lead to grave consequences for both countries in various fields such as education, health care and deprivation of certain age group.

Social issues interact with economic and environmental issues. They are strongly linked to economic issues such as poverty. Usually it is the poor how lacks access to health and education services and family planning which leads to a higher birth rate. The higher birth rate makes it difficult for such families to break the poverty cycle.

In addition social issues are linked to environmental issues as well. In many countries, contaminated water and polluted air are responsible for an increase in water-borne diseases and respiratory problems, all of which place an extra burden on local health care systems.

**Economy:**

Historically speaking, the development in most cases is linked to economic growth (Jackson & Roberts, 2000). Economic issues are concerned with deciding how to allocate limited resources that will be used to meet human needs and wants (Suneja,2000). If the economy of a country is healthy, then most of the basic human needs and wants are met. Unfortunately in many countries the resources are not allocated on a just basis and most of the wealth goes to a certain group into society creating inequality and consequently unsustainability (Soubbotina, 2004 ).

The relatively new concept of the globalization has emerged due to the advancement in transportation and communication technology. Globalization links the economies of the world's countries providing more opportunities to development and more

challenges to the environment. As a result of this phenomenon, the world economies can not function independently any more. Rather they are inextricably link through trade and investment.

Economic policies must ensure the sustainable use of natural resources. Overuse of natural resources in the short term may threaten the economic future of a country.

The economy and the social factors are interdependent. The economy depends on the households to supply it with capital and labor while the economy supplies the household with wages. In addition the lack of investment in education and training of workers leads to slow economic growth.

Furthermore the rapid population growth may limit the economic system's ability to meet people's basic needs and provide jobs for everyone who wants to work.

### 2.1.3 Indicators of sustainable development:

Sustainable development indicators measure sustainability or sustainable development performance. Chapter forty of agenda 21 encourages countries to develop sustainable indicators. Indicators are important because they bring focus on sustainable development; and they assist decision-makers at all levels to adopt sound national sustainable development policies (UNCED,1992).

Although traditional economic indicators such as GNP and GDP are the most common approach to assessing the countries' level of development (Soubbotina, 2004), they are inadequate and a poor reflection of people's well-being (friend of earth, 2006).

This prompts the creation of indicators that would go beyond the GNP and GDP, indicators that would measure and describe the welfare of the societies more accurately.

Thus, sustainable development indicators should indicate the pressure a society puts on the environment especially the pressure exerted by the use of natural resources both renewable and non renewable and the input of waste. In addition these indicators should take into account the resulting state of the environment as compared to the sustainable states; and not ignore the response by human activity in the form of political and societal decision, measures and policies (Pinter et al, 2005).

Pulselli(2005) cited a number of indicators that are used to measure the progress towards sustainable development . They include Measure of Economic Welfare (MEW) by Nordhaus and Tobin, the Human Development Index (HDI) by UNDP, the

Genuine Progress Indicator (GPI) by Cobb and Halstead and the Sustainable Net Benefit Index (SNBI).

Some of these indicators stress the economic factors of development while others focus on social factors. One of the most balanced indicators is the index of economic welfare index abbreviated as ISEW. ISEW was developed jointly by an economist, Herman Daly, and a theologian, John Cobb (Pulselli, 2005) a fact that reflects the importance of interdisciplinary approach to the sustainable development. ISEW described by the Friends of the earth organization as one of the most "advanced" attempts to measure sustainable development. It adds that the ISEW tries to measure the real increase in the quality of life and not average income only (friends of earth, 2006).

It covers different areas of economic, social and environmental factors such as income inequality, environmental damage, and depletion of environmental assets (friends of earth, 2006)

Hackett (2006) define the ISEW as "Per-capita real consumption spending with a variety of socioeconomic and environmental factors taken into accounts"

Pulselli(2005) indicate that ISEW is a composite of traditional measures of economic performance, with information on the land management and population behavior and their impacts on the environment and their sustainability. The ISEW can be roughly calculated by the following formula (Daly & Cobb, 1989).

ISEW = personal consumption + non-defensive public expenditures - defensive private expenditures + capital formation + services from domestic labor - costs of environmental degradation - depreciation of natural capita

The ISEW has been calculated for a number of countries around the world. These include Great Britain, Sweden, Austria, the Netherlands, Italy and Chile (Pulselli, 2005).

Unfortunately the researcher has found no study of ISEW on Bahrain.

The following diagram shows a comparison between the GDP and ISEW for the United States.

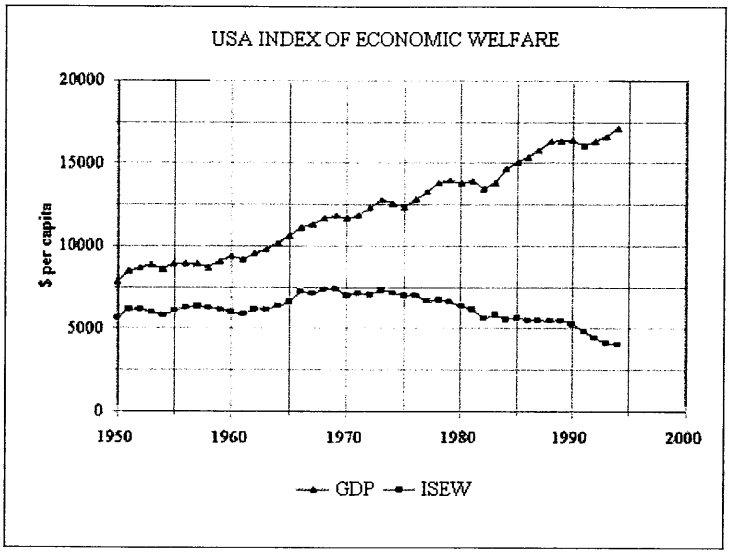



Figure2. USA index of economic welfare (Friends of earth, 2006)

The diagram shows that in the United States GDP and ISEW moved along hand-in-hand up until the 1970s. From that point on, not only they began to diverge, but also the ISEW began to decline whilst GDP continues its heady increase.
This figure reinforces the idea that using a traditional economic indicator only will not give a clear picture of the state of people's well-being.

### 2.1.4 Challenges to sustainable development in Bahrain

Bahrain is a kingdom situated in the in the Arabian Gulf midway between the Qatar peninsula and Saudi Arabia. It is composed of thirty three islands. It has a total area of seven hundreds $km^2$. The population of Bahrain is 650,604 in 2001. The majority of the population is concentrated in the northern part of the country.
The official language is Arabic although English is widely spoken in Bahrain.

**Population growth:**

Until the year 1945 the population number was very low. According to the first census carried out in Bahrain in 1941, the number of population was 89,970(Al Amid, 2006). This is attributed to the low economic and health status in Bahrain. Since than, Bahrain has experienced a rapid growth in its population because of the influx of foreign workers seeking to work in Bahrain in addition to high fertility and low mortality rate especially at birth due to the improvements in the health sector.

Indeed the number of indigenous people has increased seven folds because of the high fertility rate 2.7 which is considered one of the highest in the world (MSMAEA, 2002).

The explosion in population number has grave ramifications on all aspects of life on this island whether environmental, social or economical.

**Consumption trends:**

In addition to the high rate of population growth, the resources are used unsustainably in Bahrain (MSMAEA, 2002). This can be seen in the increase of consumption of most resources. For example the Annual Per Capita Consumption of electricity *(kW/h)* in Domestics Sector has increased 1.30 fold between the year 1994 and 2003. In the same period the number of registered vehicle has increased by 1.70 fold causing depletion of oil and other materials besides a huge affect on the economic and social life.

**Fresh water scarcity:**

In 1924 the first well was dug in Bahrain and since then the number of the wells has increased to 2000 in 1997 to meet the demand created by population growth and the expansion of the industry (Almadni et al, 2000).

The quantity of water abstracted from these wells estimated to be 252 million cubic meters per year by far exceeding the safe yield which is about 112 million cubic meters per year (Almadni et al, 2000).

The excessive abstraction of groundwater makes it unsustainable and led to a number of problems. The level of groundwater is dropping by 10 cm per year leading to intrusion of seawater and the deterioration of the quality of the groundwater. Moreover the natural springs run dry in a country once renowned for many of them (MSMAEA, 2002)

As a result, the agricultural land has shrunk dramatically a reality that can not be seen more clearly than in the case of palm trees. Bahrain Once was a proud country of one million palms but now it has less than 400,000 palms (MSMAEA, 2002)

Faced with this reality the country has become more and more dependant on the desalination of the Arabian Gulf water. Currently Bahrain obtains 13 % of its total water demand from desalination (MSMAEA, 2002).

The process of desalination provides a magical solution to the problem of water shortage. However this does not mean it is without shortcomings. Despite all the improvements in the efficiency of the desalination process from energy point of view, the process still remains highly energy intensive. In addition to the energy cost, the capital, the maintenance and the manpower constitutes the major cost of desalination. According to one estimate one cubic meter of desalinated water produced in the gulf costs about $ 0.74(Al-Mutaz, 2001 ).

Besides, there are environmental problems associated with desalination. These problems include the production of hypersaline brine which is classified as industrial waste by the United States environmental protection agency (Environmental Protection Agency, 2006a) and has the potential to harm the ecosystem especially marine environments where the turbidity is low and evaporation is high a characteristic of the Arabian Gulf. It has the potential to harm the corals living in the gulf and thus potentially harming the fish stock in it (Basson et al,).

Another problem arises from the cooling water discharges that increase the thermal load in already highly stressed ecosystem. In addition, there are a number of potentially harmful substances that are discharged because of desalination. Again these substances have the potential to harm the Gulf environment(Al-Mutaz, 2001).

**Degradation of marine environment:**

The Arabian Gulf is entrenched deeply in the souls and minds of the Gulf peoples. It is the source of inspiration for many poems and poets. No wonder, because this body of water has played an ultra vital role in their lives. It is the source of wealth and conflict. The environment of the gulf is one reason for that. It has diverse ecosystems such as sea grass meadows and coral reefs among others. These ecosystem play a very important part in the economy of the gulf both historically ant at present. Historically, the gulf was the source of the pearls industry on which many people in the gulf were dependent on. Presently the gulf is the sole source of income for many thousands of artisanal fishermen.

The Gulf has been and continues to be the main source of seafood and one of the most important sources of proteins for the peoples of the gulf (Bassoon et el, 1981).

Many oil wells are found in the gulf waters providing the gulf countries with unprecedented wealth and supply many regions of the world with energy. Yet the gulf is threatened with unprecedented pressures. The menace of pollution especially from oil and untreated or partially treated sewage is always present and poses a serious

threat to the fragile ecosystems of the gulf. In addition the rapid development on the gulf coasts threatens the various biotopes through dredging and reclamation. Especially vulnerable because of dredging and reclamation is the coral reefs which is a very important habitat for many of the economically valuable fishes (Basson et al, 1981).

**Atmospheric pollution:**

Bahrain has different sources of air pollution. These include the ever growing number of vehicles added to the road, the activity in Bahrain international airport , the industrial area in the east of the country, and the power plants. According to the Public Commission for the Protection of Marine Resources, Environment and Wildlife which is the watchdog agency responsible for monitoring the air pollution levels, the pollution levels for most of the measured pollutants are within the allowable levels. Though there are exceptions. Carbon monoxide is reported to exceed the allowable level in one area while the hydrocarbons particulates exceeded the allowable levels in all measured areas around Bahrain (Omran, 2002).

Unfortunately the government report does not tell the whole story. From time to time people in Bahrain can suffer from pollution and its consequences. For example, the gas leak in spring of 2005 which affected the people of Maameer village reflects the extent of air pollution problem in Bahrain. Many people were affected and as many as 50 people were hospitalized including reported cases of miscarriages caused by air pollution related diseases. (Alwasat, 2005)

The officials refused to acknowledge the existence of the problem at first. However under high public pressure a committee to investigate the issue was established later (Alwasat, 2005).

Unfortunately, this reflects the length to which the society should go emphasize its right into a sound and healthy environment.

**Wastes and chemicals:**

Bahrain faces a serious waste problem (MSMAEA, 2002). The domestic waste generation rate in Bahrain is 1.67 kg/person/day which is well above the average rate in the developing countries. The problem shows no sign of abating. On the contrary, the domestic waste generation continues to rise by 3.6 annually. The growth is not

confined to the domestic waste but to all types of the waste. For example, the industrial waste and medical waste grew by 1.2 and 5 % respectively.

With all these environmental problems and challenges, people around the world including in Bahrain have to find ways to adopt a sustainable way of life. Here it is very important to emphasize that sustainable development and the education are intertwined and inseparable. An entire chapter in Agenda 21 which is chapter thirty six is devoted for education and training. Agenda 21 states that education "is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues" (UNCED, 1992).
This has led to the birth of education for sustainable development.

## 2.2 Education for sustainable development:

Education is one of the most important tools for achieving sustainable development. It is through acquiring knowledge, the positive attitudes are instilled and which hopefully in turn would be translated into environmentally responsible behavior.
The following discussion would concentrate on the education for sustainable development and the concepts necessary to develop it.

### 2.2.1 Learning and acquisition of knowledge

Gage and Berliner (1998, p.208) defines learning as "the process where by humans changes their behavior as a result of experience". They think that learning is time dependent process that needs some action in order to measure it.
The interchange between humans and their environment is necessary for stimuli to take on meaning and associations to be made between the stimuli and the responses and for learning process to take place.
The process of learning involves relatively enduring changes in the nervous system. Physiologically speaking learning begins as a reversible change in the electrical and chemical properties of the neurons and functions of synapses. It is followed by change in structural and chemical properties in the synapses that is more permanent. (Pasley, 1998).
Learning occurs under different conditions. Thus there are many different forms of learning. Of the most studied forms of learning are: habituation, classical conditioning, operant conditioning and learning by observation.

Learning through habituation occurs when there is "a decrease in perceptual response to a repeated stimulus" (Coon, 2004, p.213)

Although it is very simple, habituation is very important form of learning. Usually learners' environment is full of repetitive and unimportant stimuli. If they pay attention to each and every stimulus, a lot of valuable energy would be lost.

On the other hand, Classical conditioning was discovered by accident in the early 1900s by Russian physiologist Ivan Pavlov. (Mazur, 1998)

In this process of learning, the learner pairs a neutral stimulus with an unconditioned stimulus to elicit an unconditioned response. Behavior is altered as a result of experience and learning takes place (Gage and Berliner 1998, p208).

There are four principles that characterize the classical conditioning. (Mazur, 1998):

1. Acquisition: it is the initial phase of classical conditioning when two stimuli which were not associated at the beginning become associated.
2. Extinction: it is used to describe the elimination of the conditioned response by repeatedly presenting the conditioned stimulus without the unconditioned stimulus.
3. Generalization: it is the respondness to similar stimuli without further training. And
4. Discrimination: it occurs when individual learns to produce a conditioned response to one stimulus but not to another stimulus that is similar.

In operant conditioning the learners try to modify their behavior to obtain reward or to avoid punishment (Mazure, 1998).

There are six principles guiding learning by the operant conditioning (Mazure, 1998).
:

1. Reinforcement: it is used to increase or strengthens the behavior. It could be positive or negative.

Of very important consideration of reinforcement is the schedule of reinforcement which is a "rule that specifies the timing and frequency of reinforcers" (Gage and Berliner 1998, p.290).

2. Punishment: it is used to decrease or weakens the behavior. It could be positive or negative as well.
3. Shaping: it occurs when the teacher begins by reinforcing a response the learner can perform easily and then he/she gradually requires more and more difficult responses.
4. Extinction: it is the elimination of a learned behavior by discontinuing the reinforcer of that behavior

5. Discrimination: is learning that a behavior will be reinforced in one situation but not in another
6. Generalization: is responding to similar stimuli without further training.

Learning by observation involves watching the behavior of another person, called a model, and later imitating the model's behavior (Gage and Berliner 1998).

No direct personnel experience with stimuli, reinforcers or punishers is needed. Thus the learning process by observation is different from operant and classical conditioning.

Learners acquire knowledge, skills, attitudes, and culturally appropriate behavior more efficiently with fewer mistakes when they observe the behavior and consequences of those behavior for models.

In order for the learning by observation to take place, four factors must be present (Mazure, 1998):

Attention: learner must pay attention to the crucial details of the model's behavior.

Retention: the learner must be able to retain all of this information in memory until it is time to use it.

Reproduction: the learner must have the physical skills and coordination needed for reproduction of the behavior.

Motivation: learners are more likely to imitate a behavior if they expect it to lead to some type of reward or reinforcement.

There are two main cognitive perspectives on learning which are the information-processing and the Piegetrian prespectives.

The information-processing perspective describes how the learner acquires knowledge about the world is acquired, stored, and retrieved from memory. It sees human cognition as a series of stages through which information passes sequentially. In this model, the environmental stimuli are stored briefly in the short-term sensory storage (STSS). If the learner pay attention to this stimuli it would be transferred to the short-term memory otherwise it would forgotten. The short-term memory (STM) is the conscious memory and relates to what the learner is thinking about at any given moment in time. The information stored in STM can be used to elicit a response or it could be forgotten. If the information received by the learner is rehearsed or encoded, it is transferred to the long-term memory (LTM) which can be retrieved again into the STM to elicit a response (Gage and Berliner, 1998).

The following diagram is a visual representation of the information processing model described above.

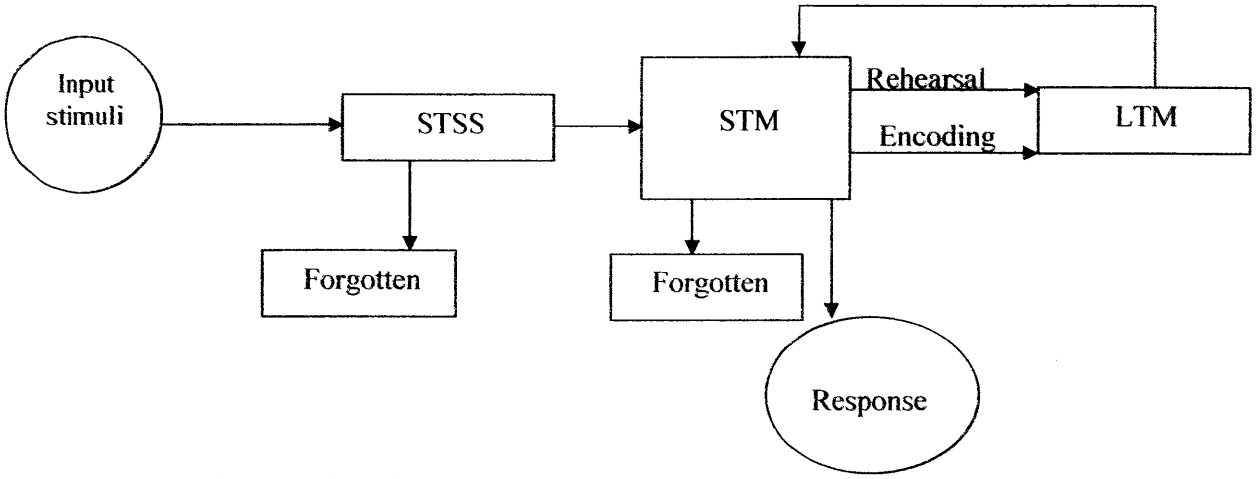



Figure 3. Information processing model (Gage and Berliner,1998)

The second approach is based on work of the Swiss psychologist jean piaget .

His theory was about the development of knowledge in human beings. Piaget sees the growth of knowledge as a progressive construction of logically embedded structures superseding one another by a process of inclusion of lower, less powerful logical means into higher and more powerful ones up to adulthood (Driscoll, 1994).

He divided the growth of knowledge into four stages:

1. The Sensorimotor Period (birth to 2 years): This stage is characterized by the transformation of the child development from unrelated reflexive movements to behavior that reflects knowledge of simple concepts.
2. Preoperational Thought (2 to 7 years): This stage is characterized by the ability of the child to act mentally on the objects.
3. Concrete Operations (6/7 to 11/12 years): This stage is characterized by the proper use of logic.
4. Formal Operations (11/12 to adult): In this stage humans are able to think abstractly and have the ability to draw conclusions from the information available.

There are several factors affecting the processes of learning. They include age as illustrated by Piaget, motivation, prior experience, intelligence and the presence of learning and developmental disorders such as hyperactive attention-deficit disorder (Mazure, 1998).

### 2.2.2 Attitude formation and change:

Attitudes are psychological tendency to positively or negatively view a particular entity such as a person, behavior, or event; and they are organized through experience and they are closely related to beliefs (Bordens and Horowitz, 2001).

Baron and Byrne (2004) believe that attitudes represent a very basic component of social cognition and they often influence behavior, especially when they are strong, accessible, and long-standing.

According to Aronson et la (2003), attitudes have social or hereditary origins and composed of three components: affective, cognitive, and behavioral components. They are based on people's feelings and values; on a person's beliefs about the properties of the attitude object, and on self-perceptions of one's own behavior when the initial attitude is weak or ambiguous.

Attitudes can be developed through social learning. According to Baron and Byrne (2004) learning forms discussed above play a major role in acquiring and forming attitudes. They see Attitude formation as a basic cognitive process that can be viewed as almost automatic.

People form attitudes toward things that they have seen before, but do not necessarily remember seeing.

Attitudes serve several functions. They educate, motivate, establish identity, enhance self-esteem and have a self-defensive function (Lord, 1997).

Persuasion and the cognitive dissonance are the two of the most widely quoted theories in the change of attitudes.

According to Baron and Byrne (2004) Persuasion is the efforts taken by the educators to change others' attitudes through the use of various kinds of messages.

The effectiveness with which persuasion efforts would change an attitude depends on the content of the message, the source of the message and the receptive audience (Lord, 1997).

On the other hand, cognitive Dissonance is uncomfortable internal state which results when individuals notice contradiction between two or more attitudes or between their attitudes and their behavior. The dissonance or conflict serves as a source of encouragement that compels the mind to acquire or invent new thoughts or beliefs, or to modify existing beliefs, so as to minimize the amount of dissonance between cognitions (Baron and Byrne, 2004) .

Attitudes can be measured directly or indirectly. The direct measurement of attitudes includes the application of: likert scales, semantic deferential scales and latitudes of acceptance (Lord, 1997).

The best known method used to measure the attitudes indirectly is the bogus pipeline technique in which the researcher convinces the respondent that he has a pipeline into the respondents' real attitudes so that the respondent would provide honest answers about attitudes that might be socially undesirable(Lord, 1997).

### 2.2.3 Behavior:

According to Markham (1998) Behavior is anything that an intact organism does.
It is divided into two categories observable and unobservable behaviors. The observable behavior constitutes every thing that can be watched, noticed and measured such as eating, walking. The unobservable behavior is the behavior that can not be measured directly such as thinking and imagining (Lee, 2005).
The roots of behaviors are either biologically or environmentally originated (Lee, 2005).
Indeed Leal (2003, p.3) thinks that there are four important characteristics in shaping the behavior which are: hereditary, knowledge, motivation and competence.
According to Cottrel and Graffe (1997) individual construct such as knowledge and attitude can not predict behavior. However, these constructs can be used collectively to predict behavior.
McKee et al (2000) noticed that the change of behavior is complicated but when it occurs it is long lasting.
The continually changing environment around us dictates that we change our behavior in order to adapt to it. The processes of adaptation result into authentic learning.
Behavior can be measured by defining the behavior in observable manner. This step is followed by recording the behavior as a frequency or duration. Sometimes the product of the behavior is measured. All behavior recordings must be registered in context of time. (Lee, 2005).

### 2.2.4 Definitions of education for sustainable development

Education and sustainable development are inseparable because education can provide people with knowledge and skills necessary to live a sustainable life. Education is an essential tool for sustainable development (McKeown, 2002).
Also known education for sustainability or sustainability education, education for sustainable development can be defined as" a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, and commitment to engage in responsible individual and

cooperative actions. These actions will help ensure an environmentally sound and economically prosperous future." (Anon, 1994)

According to McKeown (2002) education for sustainable development should integrate the three components of sustainable development which are environmental, social and economic.

The environmental component should educate the learners to live in harmony with nature, to use the resources properly, and to apply the precautionary principle which indicate that full scientific certainty is not necessary to initiate preventive action when it is apparent that an activity is a possible threat to the environment or human health.

The economical component should focus on ensuring that the development process is in line with preservation of the environment. It should teach people to recognize and change the unsustainable patterns of production and consumption.

The societal component of education for sustainable development should emphasize human development, elimination of poverty and ensuring equity among other social issues.

Based on agenda 21 especially chapter 36, McKeown(2002) recognize four actions to achieve education for sustainable development which are:

(1) Advance essential education: in order for basic education to move toward sustainable development education, it should focus not only on basic literacies such as reading, writing, math and science literacy but rather it should take a holistic approach that takes attitudes, values and behavior into consideration.

(2) Reorient existing education to deal with sustainable development: a properly reoriented education for sustainable development education should include more principles, skills, and values related to sustainability than are presently included in most education systems.

(3) Expand public understanding and awareness: the role of the public is very important because they affect the environment in more than one way for example when they exercise their right of voting. In addition to formal education, non formal education could play an ultra vital role in enlighten the public about sustainable development. The role of the television channels, newspapers and other media forms could not be overstated.

(4) Training: training is different than education because it targets a particular job or class of jobs. Training informs people of a sustainable accepted practices and procedures and gives them skills to perform specific tasks.

### 2.2.5 Core themes of education for sustainable development:

Several themes can be related to education for sustainable development. These include (Anon,2004):

**1. Lifelong learning**

Education for sustainable development is an ongoing process that continues through life of the learner and it is mediated through formal and nonformal educational settings.

**2. Interdisciplinary approaches**

Education for sustainable development is not confined to one academic subject or field of study rather it provides a unique theme to integrate content and issues across disciplines and curricula.

**3. Systems thinking**

Education for sustainable development provides knowledge and teaches different skills such as problem-solving, conflict resolution, consensus building, information management, interpersonal expression, and critical and creative thinking. Education for sustainable development offers the opportunity to develop and exercise these skills which are increasingly sought by the employers.

**4. Partnerships**

Education for sustainable development builds bridges and enhance cooperation between the educational institutions and the other institutions such as governmental and NGOs in the broader society.

**5. Multicultural perspectives**

In order to achieve education for sustainable development, there must be an understanding and respect for other culture and their way of approaching the environmental problems.

**6. Empowerment**

Lifelong learning, interdisciplinary approaches, systems thinking, partnerships, and multicultural perspectives allow individuals and institutions to contribute to sustainability.

Rowe (2002) sees that education for sustainable development is based on two concepts: Environmental literacy and social engagement.

This thesis is about measuring the environmental literacy for the undergraduate students at the University of Bahrain. Thus the researcher would concentrate on the environmental literacy and on the vehicle which delivers it the environmental education.

## 2.3 Environmental education

### 2.3.1 Introduction:

Education is a broad, diverse, complex and lifelong process through which the societies prepare their citizens to carry out their responsibilities. It is not confined to formal schooling but it also occurs in a wide range of non-formal education settings at work and at home (Blockstein,2003).

One of the most important goals of education is to shape the learners behavior. Environmental education can fulfill this goal by shaping the learners' behavior towards the environment, the society and toward themselves.

The term environmental education was first coined by William Stapp of university of Michigan in the first issue of the journal of environmental education in 1969( University of Michigan, 2001).

William Stapp was also instrumental in drafting the Belgrade charter-held in 1976- which put forward an acceptable goal statement for environmental education.

The world's first environmental issues conference was organized in Tbilisi, Georgia. It was held jointly in 1977 by the united nation education, scientific, and cultural organization (UNESCO) and the U.N environmental program (UNEP). The Tbilisi declaration formulated the Role, Objectives, and Characteristics of Environmental Education.

### 2.3.2 Definition of environmental education:

In his definition for environmental education, William Stapp emphasized the role played by knowledge of the biophysical environment and its associated problems in creating learners that are motivated in finding solutions to the environmental problems. (Stapp et al., 1969).

On the other hand the national Environmental Education Advisory Council (NAEEC) of the United States focused on the creation of awareness for the environment in total whether it is natural or man made. The NAEEC definition takes a holistic approach towards the environmental education taking in consideration the knowledge, attitudes, and values to shape the environmentally responsible behavior.

Environmental education is a complex lifelong planned process that focuses on the interrelationship between humans and their environment. It provides the learners with the necessary knowledge, skills, values and attitudes that would motivate the learner

to act independently and jointly to solve present and future problems of the environment.

That is to say factual knowledge is not the only emphasis of environmental education; rather it takes a holistic approach where the values and formation of positive attitudes are taken into account with the aim to enable the learners to act responsibly toward the environment.

### 2.3.3The goal of environmental education:

According to William Stapp, the general aim of environmental education is "to produce a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve the problems, and motivated to work toward their solution"( Stapp,1970).

The Belgrade charter defines the goal of environmental education as to develop a world population that is aware of, and concerned about the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones( UNESCO and UNEP, 1976).

On the other hand a number of educators think that the general goal of environmental education and communication is to encourage and empower the community to conserve the integrity and diversity of nature, and to ensure that natural resources are used in an equitable and ecologically sustainable manner. The empowerment is achieved through knowledge, skills, motivation, attitudes and values (Prassd, 2001).

### 2.3.4The objectives of environmental education:

According to Tbilisi declaration the objectives of environmental education is to increase people's knowledge and awareness about the environment and associated challenges, develop the necessary skills and expertise to address the challenges, and foster attitudes, motivations, and commitments to make informed decisions and take responsible action (UNESCO and UNEP, 1978).

### 2.3.5 The Outcomes of Environmental education:

Outcomes of environmental education refer to the end result, effect or the consequences of environmental education (Thomson and Hoffman, 2006).

According to Environmental Protection Agency (Environmental Protection Agency, 2006b) of the U.S, there are five anticipated outcomes from the environmental education:

1. To enhance sound environmental management.
2. To promote environmental knowledge and to increase public awareness about the environment and its issues.
3. To enhance environmental literacy.
4. To facilitate teachers' training and research on environmental topics.
5. To establish sustainable environmental education programs.
6.

### 2.3.6 Classification of Environmental Education:

There are three types of environmental education:

1. **Education in the environment**

Exploring the environment gives reality, relevance and practical experience to learning. It achieves a number of important skills valuable to the learners such as data gathering through observation, sketching, photography, interviewing and using scientific instrument. In addition the learners acquire social skills such as teamwork and appreciating the beauty of the environment.

Education in the environment makes the learners to understand the complexity and wonder of the nature systems (Fien, 1988,p.11).

2. **Education for the environment:**

The learners develop the willingness and the ability to use the environmental resources wisely. It is directed to influence environmental issues and concerns and it involves the learner to solve a real problem in natural settings as it occurs in nature (Fien, 1988, p.11).

3. **Education about the environment**

It gives the learners information about how natural systems work and the impact of human activities upon them. This would be achieved through learning about political, philosophical, economic and socio-cultural factors as well as about the ecological ones that influence decisions about how to use the environment responsibly (Fien, 1988, p.11).

This is an information gathering and knowledge expansion exercise e.g. formal lectures, seminars, literature searches and reviews.

In the researcher opinion, if the first type of the environmental education is adopted in our education system, this would make our education more effective because it would engage the students more in the learning experience and it would make the knowledge more functional from the students perspective.

## 2.4 Environmental Literacy:

This thesis is about the environmental literacy. in the following discussion, the researcher would investigate a number of issues related to the environmental literacy.

### 2.4.1 Definition of environmental literacy

There are many definitions for environmental literacy and a common definition may be never reached (McBeth, 1997)

Morrone et al (2001, p.34) see that environmentally literate persons have more than just ecological knowledge; rather they have to combine environmental knowledge and attitudes with the purpose of acting responsibly toward the environment.

Roth (1992) defines environmental literacy as "the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems".

He thinks that an environmentally literate person should be able to demonstrate in some observable forms their knowledge of key environmental concepts, skills acquired, disposition toward issues, and the like.

He suggested three levels of environmental literacy.

- Nominal which indicates the ability of learner to recognize and define the basic terms used in communication about the environment.
- Functional which indicates the ability of the learner to have deeper knowledge about the interrelation between the human social systems and other natural systems.
- Operational which indicates progress by learner beyond functional literacy in both the breadth and depth of understandings and skills.

He stresses that the components of environmental literacy are: Knowledge, skills, attitudes and behavior (Roth, 1992).

Wilke (1995a, p.28) thinks that the environmental literacy should focus on building responsible environmental behavior which comes as a result of teaching

environmentally significant ecological concepts and the environmental interrelationships implied by these concepts.

Golley (1998) added that the environmental literacy is more than the ability to read and write about the environment but to have sense of the spirit of the place.

McBeth (1997) thinks that environmental literacy should include: knowledge, skills, affect, and behavior. And he added that these are the foundations upon which the assessment of environmental literacy should be based.

Coppola (1999) suggested that environmental literacy can be defined in both "cognitive terms with knowledge as a necessary precondition of thoughtful behavior and action and in conative terms with behavioral change following directly from knowledge and skills".

It is worth noting here that environmental literacy is different than scientific or any other traditional literacy. Environmental literacy investigates the environment in its totality. It tries to find the effect of man on the environment and the interrelationship between the natural and social systems.

All the definitions the researcher found agrees explicitly or implicitly that environmental literacy is composed of knowledge about the environment and the skills needed to investigate the environment and the positive attitudes toward the environment which leads to environmental responsible behavior.

The Wisconsin environmental literacy framework which was used to develop the data collection instrument of this study combines the knowledge and the skill in one category which is the cognitive outcomes and uses the word knowledge to describe both the factual knowledge and the skills . The other category is the affective or the attitude category and the third is the behavioral category.

### 2.4.2 Components of the environmental literacy

**Environmental knowledge:** Environmental knowledge can be defined as the learner's ability to comprehend and assess the effect of society on the ecosystem. This knowledge can be shown through identifying the environmental problems and their origins and consequences. (Gambro & Switzky, 1996).

According to Rickinson (2001), environmental knowledge can be studied by examining the students' factual knowledge of the environmental phenomena, their understanding (and misunderstanding) of environmental phenomena and the sources of students' environmental information.

There are several factors affecting the acquisition of environmental knowledge such as gender, socio-economic grouping, age, media and schooling (Rickinson, 2001).

Many studies have been conducted to measure the environmental knowledge.
A number of studies were conducted on people of different age, gender, race ....etc found that the environmental knowledge is low to varying degrees between the different groups.

**Environmental attitudes:**

Environmental attitudes are the degree to which individuals are concerned or indifferent in relation to the environment and/or environmental issues, and the extent to which students are willing to make sacrifices for the environment, such as willingness to conserve resources (Rickinson , 2001).
People around the world generally have high level of concern toward the environment. Schultz (2000) cited a study conducted in the United States which found that 71% of the respondents have high level of concern toward the environment. In another study conducted by Dunlap and Gallup Organization (Dunlap,1992) on people in twenty four countries around the world almost most of the respondents in these countries reflect the same high level of attitudes toward the environment.
According to Schultz (2000) there are three distinct types of environmental attitudes.

1. Egoistic: in this type of attitude individuals are concerned with their personnel health, availability of resources, financial prosperity and quality of life.
2. Altruistic: in this type of attitude individuals are concerned about other people, family, community and future generations.
3. Biosphric: the individuals concern is directed toward all living things, including plants, animals, ecosystems, and the biosphere.

Similar to the environmental knowledge, there are several factors affecting the acquisition of environmental attitudes such as gender and socio-economic class (Rickinson, 2001).

**Environmental behavior:**

Environmental behavior can be defined as the extent of learners actual and usually self- reported involvement in environmentally responsible behavior (Rickinson, 2001).
According to Stern (2000) environmental behavior can be defined into two different ways. The first definition is impact-oriented behavior while the second is intent-oriented behavior.

He defines the impact-oriented behavior as the degree to which the environmental action alters the availability of materials or energy from the environment or changes the structure and dynamics of ecosystems or the biosphere itself while he defines the intent-oriented behavior as the action that is undertaken with the intention to change the environment normally into beneficial way.

He believes the distinction between the two definitions is important because the impact-oriented definition is used to identify and target behaviors that can make a large difference to the environment while the intent-orient definition emphasizes the learners' beliefs, motives and so on and it is used to understand and change the target behaviors. (Stern, 2000)

There are three different types of environmental behaviors (Poortinga et al, 2004) which are:

1. Environmental Activism:

This type of behavior describes the active participation in environmental organizations and demonstrations.

2. Nonactivist Behaviors in the Public Sphere:

This type of behavior refers to a number of environmental responsible behavior carried out by the general public that include petitioning on environmental issues, joining and contributing to environmental organizations and support or acceptance of public policies .

3. Private-Sphere Environmentalism:

It is the action performed by the private household and it includes the purchase, use, and disposal of personal and household products that have environmental impact.

Private-Sphere Environmentalism behavior can be divided into two subtypes based on the decision they involve (stern, 2000): the first is the purchase of major household products and services that are environmentally significant in their impact such as means of transport and energy source. The second subtype is environmental consumerism where the doer considers the environmental impact of his/her purchasing practices such as purchasing recycled products and organically grown foods.

Differentiating between these two subtypes are important because some private-sphere behavior seem to impact the environment more than the other. (Stern, 2000)

There are a number of factors that influence the environmental behavior which include: personal habit or household routine such as highly constrained by income or infrastructure (stern, 2000)

In addition, Rickinson (2001) stated that there are several factors that control the behavior of the learner that include socio-economic grouping, schooling, and gender.

### 2.4.3 The relationship between the environmental literacy components:

One purpose of this thesis is to look at the relationships between the major components of the environmental literacy i.e the environmental knowledge, the environmental attitudes and the environmental behavior. The following discussion is related to the literature on this relation.

**Knowledge and attitude:**

In a study conducted by Bogan and Kromrey (1996) on high school students in the state of Florida in the unites states, they found a moderate correlation between knowledge and attitude. Hoody (1996) cited another study conducted by Ramsey and Rickson found that knowledge is strongly correlated to attitude.
Iozzi(1989) suggested that the attitude and knowledge works cooperatively.
From these studies, it can be concluded that the knowledge is strongly to moderately related to the attitudes and knowledge may be a mediation factor for formation of attitudes.

**Attitude and behavior:**

Sets and Biga (1989) cited several studies on the correlation between attitude and behavior which found that there is a modest relationship between attitude and behavior.
Bogan and Kromrey (1996) found that there is high correlation between attitudes and behavior.
These studies and others indicate that attitudes may be mediators of environmental responsible behavior.

**Knowledge and behavior:**

In Many studies the researcher has examined, it appears that there is weak correlation between knowledge and behavior.
Bogan and Kromrey (1996) found that the lowest correlation between the environmental literacy components was between the environmental knowledge and environmental behavior.

In another study conducted by Kuhlemeier et al(1999) to asses the environmental literacy for the ninth grade students in Holland, they found that there is also a weak relation between the environmental knowledge and the behavior.

The same result was found by a study conducted by Hines et al(1986/87) after performing a meta-analysis on 128 studies conducted on predicting the environmental behavior.

The weak relation ship between the environmental knowledge and that of the environmental behavior shows that teaching the environmental knowledge only would not result into an environmentally friendly behavior which is the desired outcome of the environmental education.

**Theory of reasoned action:**

There are a number of theories and frameworks that discusses the relationship between the three major components of the environmental literacy.

One of the most cited theories in this field is the theory of reasoned action developed by Ajzen and Fishbein (1980). The theory essentially correlates behavior with attitudes. Attitudes and subjective norms lead directly to behavioral intentions which can be used to predict behavior. The subjective norm here refers to individual's beliefs about whether their society's members believe that the individual should or should not engage in a specific behavior.

Figure four outlines the theory of reasoned action.

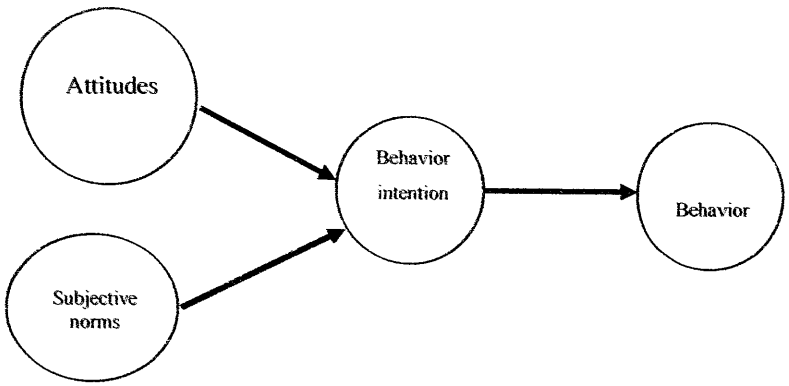



Figure 4. Theory of reasoned action (Azjen and Fishbein 1980)

Knowledge is not mentioned explicitly in the theory. However besides the studies cited above in the relation between the attitudes and knowledge other research suggests that predisposing factors of knowledge influence attitudes and thus

contribute to behavior intentions (Hanna, 1995). For example young children exposed at an early age may be more likely to have an attitude toward wilderness and behave in ways that reflect that attitude.

Further more Roth and Perez (1989), suggest that there is a substantial correlation between students' knowledge of environmental issues and their attitudes toward the environment.

They think that a good background in environmental knowledge could eventually lead to the development of positive attitudes toward the environment.

### 2.4.4 Environmental literacy in higher education:

Universities and other higher education institutions are the trees whose produce are the future leaders in all different walks of life. They are in the forefront in spreading knowledge and values to the communities.

Agenda 21 encourages universities and other higher education institutes to play a strong role in developing environmental literacy and moving the societies toward a sustainable life style. And as Mckeown (2002) puts it" Higher Education plays a profound and pivotal, but often overlooked, role in making this vision of a sustainable future a reality".

Cortese (1999) emphasize the need of the societies for environmentally literate graduate students but he added that educational curricula often do not adequately address this need. Unfortunately many studies and surveys showed that the higher education institutions are not playing the role expected from them in the field of environmental literacy. In a survey published by the Worldwatch Institute only 13 % of the more than 715 universities that are members of the American Association of Colleges for Teacher Education obliged their students to take courses related to environmental literacy. In another survey ( Wolfe, 2001) conducted on 84% of the higher education institutions in the United States, only 11% of the 42% respondents confirm that their students are required to take an environmental literacy related courses.

Unfortunately the researcher has not found any similar survey conducted on the higher education in the Arab World. This may reflect the inadequacy of research in this field despite of its importance.

Hungerford et al(1980) emphasized the importance of environmental education curricula in improving environmental literacy. They proposed four goal levels in order for environmental education curricula to produce an environmentally literate learner.

Level one would be concerned with developing the learner understanding of the ecological principles such as interaction and interdependence, energy flow and material cycling, and ecosystem succession. Level two would focus on helping the learner to understand how humans perceive and value the environment. Level three should provide the learner with the ability to investigate the environment and to find alternative solutions to the environmental problems. Level four teaches students skills needed to take necessary environmental action.

Wilke(1995b) sees that environmental literacy in higher education should emphasize developing environmental responsible behavior. In his opinion this could be achieved if the higher education curricula's have the following:

- Ecological concepts and the interrelationship between natural and social systems
- In-depth knowledge and skills that enable the learner to analyze and investigate the environmental problems and it would teach them about the means necessary to mitigate these problems.
- It should provide educational setting that would encourage the learners to be positive agents for change.

Rowe realized that there are several approaches and models used to incorporate environmental literacy in higher education. These include: environmental concepts as part of the degree requirements, the infusion of the environmental literacy paradigm across the curricula, development of interdepartmental minors, use of environmental literacy in other sectors of the institution as the latent curricula, and integration into the mission statement.

Here is a brief discussion of each one of these models

1. Environmental literacy included in degree requirements:

The undergraduate general education requirements have to change in order to include a degree requirement for environmental literacy i.e. the student can not graduate without taking at least one course that include in depth concepts about the environmental literacy. There are a number of examples for such model. The university of Wisconsin-Stevens Point outlines fourteen competencies that should be fulfilled by the students if they to graduate. Environmental literacy is one of them. This has translated in into a three credit course that must be studied before the graduation of the student. This course could be proposed by any department and it

must be interdisciplinary. The university encourages across curriculum and team teaching approach (wilke,1995b)

In Minnesota, U.S the change toward the environmental literacy begins at the state level. In the Minnesota Transfer Curriculum project, the state recognizes 10 competencies to be achieved by the states learners. Like university of Wisconsin one of these competencies is the environmental literacy. Thus the University of Minnesota requires its students to take at least one course of deep exposure to environmental literacy (Rowe,2002).

Unfortunately as indicated earlier the number of higher education institutes with this requirement is not enough. This could be further supported by a survey conducted by The National Wildlife Federation's Campus Ecology program in the United States. The survey found that only 8% of the universities and colleges necessitate the environmental literacy as a degree requirement (Rowe,2002).

2. Infusing sustainability across the curricula models

A number of universities have organized a series of workshops to help the faculty from different disciplines to incorporate environmental literacy concepts in their teaching. Rowe( 2002 ) suggested that this may help faculty increase the internal political acceptance required to teach environmental literacy. In the higher education which adopt this approach a shift in teaching paradigm was created from a paradigm of conquering and overusing the natural resources to a paradigm of sustainable development and the ongoing challenge of creating a more humane and environmentally healthy future society.

This approach has been adopted by a number of universities and colleges such as Northern Arizona University, Emory University, and Tuskegee University. Rowe(2002)

3. In house professional development resources for infusion of environmental literacy

In this approach the support needed by the faculty to incorporate environmental literacy is provided by an in house institute. A good example of this approach can be found in the Program on Environmental Education and Research (PEER) at Massachusetts institute of technology. Another example is Tufts environmental literacy Institute (TELI).

4. Developing interdepartmental minors in environmental literacy

Some universities have created interdepartmental minors that address the need to achieve the environmental literacy competency. The advantage off this approach is that it assembles students from different disciplines and let them to discuss

environmental problems from different perspectives. However there is disadvantage to this approach if only it is used. The benefits would be confined to those students who take it.

5. Sustainability in other sectors of the institution as the latent curricula

According to Rowe (2002) the latent curricula is the cultural norms and organizational culture shaped by the research, operations, student activities and college-community partnerships. There are several institutions that use the latent curricula to reinforce the concept of environmental literacy. These include: University of Georgia and Suny University at buffalo.

6. Integration into the mission statement:

The mentioning of environmental literacy into the mission statement would give support to integrating environmental culture in all level of administration.

## 2.5 Summary:

Sustainable development is a concept that has been adopted by the United Nations in order to grant the right of the development to the world's nations but not on the expense of the environment and social justice. This type of development is necessary because of the environmental problems and challenges facing the world in general and the researcher country the kingdom of Bahrain. These challenges are many yet the most pressing issues are the population growth, fresh water shortages, consumption trend, degradation of marine environment and waste.

Agenda 21 which was adopted by United Nations Conference for Environment and Development as a road map to show the countries the mechanisms of implementing sustainable development. Chapter thirty six of this agenda has been devoted to the education and training. As a result of this emphasis, education for sustainable development has been adopted where the three components of sustainable development should be taught. Educationalist realized that the current education system is not in line with education for sustainable development and they propose a number of actions to transfer the current education system into education for sustainable development. These actions include advancing essential education, concentrating on principles and values of sustainable development, enhancing public awareness and training in the field of sustainable development. Besides of its importance to the environment, education for sustainability is also appealing to the job market because it instills a number of themes in its students. These include: problem-solving, conflict resolution, consensus building, information management, interpersonal expression, and critical and creative thinking. Environmental literacy is at the heart of education for sustainable development. It is worth noting here that environmental literacy is an outcome of the environmental education. The expression environmental education was first coined by William Stapp in 1969 and since then the goal, objectives and the outcomes of the environmental education has been formulated. As it is indicated, one outcome of the environmental education is the environmental literacy which is the subject of this thesis. An environmentally literate student is a student that has more than knowledge about the environment. He or she must have environmentally friendly attitudes and behavior in order for the environment to be protected and preserved for the future generations. Here comes the role played by the universities to enhance the environmental literacy within their students and they can choose from a number of models in order to implement the environmental literacy to ensure their leadership position in this very important filed.

# Chapter three

# Methodology

## 3.1 Introduction:

This thesis is about measuring the environmental literacy for the undergraduate students at the University of Bahrain.

A survey has been used to conduct this study. There are two broad categories for surveys (Kumar, 1999) which are the interview and the questionnaire.

interview can be defined as" any person –to- person interaction between two or more individuals with a specific purpose in mind" (Kumar,1999) while the questionnaire can be defined as "a list of written questions, the answer to which is recorded by the respondents." (Kumar,1999)

The interview is a useful instrument when in-depth information is needed and it allows flexibility in data collection. However the interview method is time and resource consuming. Thus only limited number of respondents can be surveyed (Kumar, 1999).

On the other hand the questionnaire is less expensive and it saves time and the other resources. Besides, the questionnaire allows greater anonymity a feature very important to obtain accurate response especially when the questions being asked are sensitive (Kumar, 1999).

Due to the constraints of time and resources, the researcher has decided to use the questionnaire as his principle method of data collection.

In this chapter the researcher would look at the framework used to formulate the questionnaire, the sections of the questionnaire, the validity, the reliability, the population, the sample, the way the data collected and the analysis of data.

## 3.2 The questionnaire:

The questionnaire used as the main tool for this study composed of three sections that reflect the major components of the environmental literacy. Both the attitudes and the behavior section utilize a five point likert- type scale while the knowledge section uses the multiple choice test format. The questionnaire contains both positive and negative statements as it is the convention in building the questionnaire. Thus, a reverse coding has been applied to the negative statements.

The questionnaire used in this study is based on Wisconsin environmental education framework (WEEF)( see appendix C).

### 3.2.1 The Wisconsin environmental education framework (WEEF)

WEEF was developed by Wisconsin environmental education center. Since then the framework has been extensively used to test the environmental literacy throughout the United States and the world. It was used as basis to test environmental literacy in Wisconsin, Minnesota, Pennsylvania and the UK to mention but few (Champeau, 1997). The framework is divided into three categories, which could be summarized as follows:

1. Cognitive learning outcomes which include:
    - Knowledge of ecological foundations
    - Knowledge of environmental problems and issues
    - Knowledge of environmental issues investigation and action strategies.
2. The affective learning outcomes which include :
    - Environmental sensitivity
    - Values related to prevention and remediation of environmental problems and issues
3. The environmental behavior

The environmental behavior is categorized into two main groups:

- First: perspective on environmental responsible behavior which include :
    - Locus of control
    - Assumption of personnel responsibility
- Second: environmentally responsible behavior which include
    - Ecomangment or habitat management
    - Economic action
    - Persuasion
    - Political action
    - Legal action

The questionnaire used in this study follows the same arrangement as above. It is composed of three sections which -after renaming the first and the third- are: environmental attitudes (affective), environmental behavior and environmental knowledge (cognitive).

A minor modification to the original Wisconsin environmental education framework has been carried out. Many scholars in the education field including Marcinowski, Rehring(1995) and Azjen(1988) place the perspective on environmental responsible behavior under the affective section of environmental literacy. Thus in the questionnaire it would be included under the attitudes section.

### 3.2.2 Sections of the questionnaire

The questionnaire is composed basically of three parts which reflect the major components of the environmental literacy. These parts are the environmental attitudes, the environmental behavior, and the environmental knowledge. The forth part is a summation of the three parts and it is called the environmental literacy index or composite. Please see appendix (B) for the study instrument and its translation.

#### 3.2.2.1 The attitude section

The level of environmental attitudes is measured using a five point Likert-type scale that ranges from "strongly agree" to strongly "disagree". It is composed of fifteen statements that measure the attitudes of the respondents toward the environment. The highest attitude toward the environment is assigned a grade of four; and the lowest is assigned zero. The highest possible score is 60 and the lowest is zero. Some of these statements are positive while others are negative. Therefore some of the statements used are reverse coded.

The statements of the attitude section are divided as follows:

Statements one and two assess the students' environmental sensitivity.

Statements three to thirteen assess the students' attitudes for the prevention and remediation of environmental problems and issues.

Statements fourteen and fifteen assess the students' locus of control.

#### 3.2.2.2 The behavior section:

Similar to the attitude section, this part uses a five-point likert-type scale to measure the behavior component of the environmental literacy. The scale ranges from "almost always" to "never". The most favorable behavior is given a degree of four while the least favorable behavior is given zero. As with the attitude scale the highest possible score is 60 and the lowest is 0.

The statements of the behavioral section are divided into following:

Statements one, three, seven and eight assess the students' the ecomanagement behavior.

Statements two, five, ten, twelve and fourteen assess the students' the persuasion behavior.

Statements four, nine, and thirteen assess the students' the economic action behavior.

Statements six and eleven assess the students' the political action behavior.

Statements 15 assess the students' the legal action behavior.

### 3.2.2.3 The knowledge section:

It consists of fifteen multiple-choice questions organized into the following way:

1. Questions one to seven assess the students' knowledge of ecological principles
2. Questions eight to eleven assess the students' knowledge of environmental issues and problems
3. Questions twelve to fifteen assess the students' Knowledge of environmental issue investigation and action strategies.

Each correct answer equals four and each wrong answer equals zero. Thus the highest score will be: 15 * 4 = 60; while the lowest score will be: 15 * 0 = 0.

### 3.2.2.4 The environmental literacy composite

The environmental literacy index will be formed by adding the scores of the three sections.

The highest possible score will be 180 and the lowest will be zero. The environmental literacy composite or index would be an indicator for the collective environmental literacy components.

## 3.3 The validity:

Validity can be defined as" the ability of an instrument to measure what it supposed to measure" (kumar, 1999, p.137).

The validity can be established by experts in the field (Kumar, 1999, p.138). Thus a number of highly respected scientists and scholars in the environmental fields where contacted to establish the validity of the instrument. The following questions were asked from them.

1. Are the statements and the questions in survey related to the domain of interest?

2. Are the statements and the questions in survey suitable for the undergraduate students?
3. Review of the language used in the survey
4. Delete any statement or question that is not suitable
5. Add any statement or question where necessary.

The comments of the referees were taken into consideration; and modifications were made to the questionnaire where appropriate.

Please see appendix (A) for the names and positions of the referees.

**3.4 The reliability:**

Trochim(2001) defines the reliability as repeatability or consistency of the instrument. The procedures that are used to determine the reliability of the instrument can be divided into groups (Kumar, 1999):

- External consistency procedures compare cumulative test results with each other as a means of verifying the reliability of measures. Two methods are used to establish the external reliability: the test/re-test and parallel forms of the same test.
- Internal consistency procedures determine that items measuring the same phenomenon should produce the same results. There are several methods of establishing internal reliability which include: the split-half technique, – Kuder Richardson and Coefficient alpha.

The researcher has established the internal consistency for each of the three section of the survey using Coefficient alpha. Also called Cronbach's alpha, it is the most general estimate of reliability. Reliability ranges from 0 to 1. In social sciences it is preferred to have scales with reliability greater than 0.7(DeCoster, 2004).

A pilot study has been conducted on thirty eight undergraduate students at the University of Bahrain.

The students were asked to provide feedback on any ambiguity or confusion in questionnaire.

A cover page was also provided to give instructions for completing the questionnaire to ensure the questionnaire is a self-administrated one.

After completing the survey, the data were fed into SPSS for windows version 12.01 and the alpha coefficient was calculated for each section of the survey. The results were as followed:

- The attitude section alpha coefficient is 0.84

- The behavior section alpha coefficient is 0.81
- The knowledge section alpha coefficient is 0.73

Thus, all the survey sections are considered reliable by the standards of the social sciences.

### 3.5 The study population:

The population understudy is the undergraduate students of the University of Bahrain. There are about 17500 students (General Directorate of Statistics, 2004) distributed into seven colleges which they offer more than thirty Bachelor programs. The students of the University of Bahrain come from different geographic regions of Bahrain, different backgrounds and different social classes.

### 3.6 The sample size:

To determine the size of the sample reliable for the study, the following formula has been applied (Smith, 1983):

$$n = \frac{N}{1 + N\,(e)^2}$$

Where n = sample size

N = population size

e = desired level of precision

By compensating in the above equation

N= 17500

e = 0.05

$$n = \frac{17500}{1 + 17500*(0.05)^2} = 391$$

The sample size reliable for the study population is 391 students.

### 3.7 Data collection:

The number of questionnaire distributed was 490. The sample was stratified on the basis of colleges to ensure enough representation for all colleges. The researcher randomly distributed the questionnaire to the students at each college hall; and it was made sure that the students who received the questionnaire belong to the college in question. Each college received a total of seventy copies of the questionnaire. The questionnaire takes an average of twenty minuets to complete.

### 3.8 Data analysis:

The survey data were analyzed using measures of central tendency and dispersion to provide information about the level of environmental literacy of the high school sample. In addition, correlational statistics were used to explore relationships between participants' knowledge, attitude and behaviors.

#### 3.8.1 Central tendency and dispersion:

*The mean*: it is the most commonly used method for describing the central tendency. It is calculated by adding the values and dividing it by the number of values.
*The standard deviation*: the Standard Deviation shows the relation that set of scores has to the mean of the sample.
It is computed by finding the square root of the variance.
*"t" test*: A t-test is any of a number of tests base on the t distribution.
*ANOVA*: analysis of variance is "a collection of statistical models and their associated procedures which compare means by splitting the overall observed variance into different parts".

#### 3.8.2 Correlational statistics:

Correlation expresses both strength and magnitude of a relationship. There are many types of correlations but the most widely used is Pearson correlation. It measures the strength of the linear relationship between two continuous variables. It varies from – 1.0 to +1.0. The sign of the correlation describes the direction of the relationship. A positive sign indicates that as one variable gets larger the other also tends to get larger, while a negative sign indicates that as one variable gets larger the other tends to get smaller.

The magnitude of the correlation describes the strength of the relationship. The further that a correlation is from zero, the stronger the relationship is between the two variables.

A zero correlation would indicate that the two variables aren't related to each other at all.

"In social sciences, correlations around 0.30 have been considered satisfactory and consistent with this practice; we would suggest that correlations below this level are usually of little practical value even if they are significant (Azjen and Fishbein 1980, p.99)."

# Chapter four

# Findings

### 4.1 Return rate of the questionnaire:

A total of 490 questionnaires were distributed to the seven colleges at the university. The returned questionnaire number was 409. Seven of the questionnaires were excluded because of incomplete response. The number of questionnaire included in the analysis of the study is 402 making the response rate at about 82%.

### 4.2 The students' personal background

The following table (1) shows the personal background of the students according to their gender, colleges, age and class standing.

Table (1)

Students' personal backgrounds

| **SEX** | **Frequency** | **Percent** |
|---|---|---|
| male | 209 | 51.99% |
| female | 193 | 48.01% |
| **COLLEGE** | **Frequency** | **Percent** |
| faculty of arts | 57 | 14.18% |
| college of science | 58 | 14.43% |
| college of management | 67 | 16.67% |
| college of law | 52 | 12.94% |
| information technology | 55 | 13.68% |
| College of Education | 68 | 16.92% |
| Engineering college | 45 | 11.19% |
| **AGE** | **Frequency** | **Percent** |
| under 20 | 286 | 71.14% |
| more than 20 | 116 | 28.86% |
| **class standing** | **Frequency** | **Percent** |
| First | 137 | 34.08% |
| Second | 187 | 46.52% |
| Third | 55 | 13.68% |
| fourth | 23 | 5.72% |

The result of the study is organized in a way to address each question of the study.

### 4.3 Research question one

What is the existing level of environmental literacy major components among the undergraduate students at the University Of Bahrain?

#### 4.3.1 Hypothesis one

Since there is no conscious effort on the university part to promote the environmental literacy for its undergraduate students, the level of the environmental literacy components should be low.

### 4.3.2 Results:

The answer of this question would be divided into four parts. The first part would look at the results of the performance of the university students on the attitudes scale, the second part on the behavioral scale and the third on the knowledge scale and the fourth would look at environmental literacy index.

To give more meaning to the numbers in the results, the researcher would use the grading system of the University of Bahrain to compare the students' performance on the different environmental literacy scales. The means of the different aspects of the environmental literacy have been converted into a hundred to facilitate the comparison between the university grading system and the students' performance on the environmental literacy components.

The grading system of the University of Bahrain is as follows:

A: 90-100 $A^-$:87-89

$B^+$:84-86 B: 80-83

$B^-$:77-79 C: 70-73

$D^+$: 64-66 D: 60-63

F: less than 60

#### 4.3.2.1 The environmental attitudes

Part one: what is the existing level of the students of the University of Bahrain on attitude scale?

To answer this question, the mean and Std. Deviation of the sample (n = 402) responses on the attitudes scale has been calculated. Table (2) illustrates the results obtained:

Table (2)

Mean and Std. Deviation for Environmental Attitude level for University of Bahrain student

| The field | Mean | Std. Deviation |
|---|---|---|
| Total Environmental Attitude | 58.22 | 8.43 |
| Environmental sensitivity | 79.31 | 15.89 |
| Prevention and remediation of Environmental problems and issues. | 56.87 | 10.22 |
| locus of control | 44.54 | 21.56 |

Table (2) shows the following results:
The total environmental attitudes mean obtained by the university of Bahrain students is (58.22) and the std deviation is (8.43). Thus the overall environmental attitudes of the university of Bahrain students can be assigned a grade of (F).

To go deeper in the results of the attitudes scale, the following results can be seen:

- The mean and the std deviation of the university of Bahrain students' environmental sensitivity are (79.31) and (15.89) respectively showing that their environmental sensitivity has almost a grade of (B).
- On the other hand the university of Bahrain students attitudes towards Prevention and remediation of Environmental problems and issues shows a low mean (56.87) and std deviation (10.22) putting it in the (F) range.
- The level of locus of control which reflects the students' beliefs in their ability to influence environmental issues and problems is the lowest score of the attitudinal scale with a mean of (44.54) and std. deviation of (21.56) putting it firmly in the (F) range.

In brief, the score of the university of Bahrain students on the total environmental is low (F grade). Although there is good performance for students on the Environmental sensitivity, most aspects of the environmental attitudes are low.

#### 4.3.2.2 The environmental behavior

Part two: what is the existing level of university of Bahrain students on behavior scale?

To answer this question, the mean and Std. Deviation of the sample (n = 402) responses on the behavior scale has been calculated. Table (3) illustrates the results obtained:

Table (3)

Mean and Std. Deviation for Environmental behavior level for the University of Bahrain student

| The field | Mean | Std. Deviation |
|---|---|---|
| Total Environmental behavior | 39.76 | 9.33 |
| EcoManagement behavior | 39.45 | 14.88 |
| Persuasion behavior | 39.47 | 15.91 |
| Economic action behavior | 43.10 | 26.48 |
| Political action behavior | 38.71 | 20.51 |
| Legal action behavior | 36.96 | 19.81 |

Table (2) shows the following results:

The total environmental mean scored by the University of Bahrain students is (39.76) while the std. deviation is (9.33). According to the university grading system the score is at the (F) range.

To go deeper in the details, the following results can be obtained:

- The university of Bahrain students score on EcoManagement behavior is (39.45) for the mean and for the std. deviation is (14.88) which translates in to (F) range.

- In the persuasion behavior the students achieve a mean of (39.47) and std deviation (15.91) giving them a grade of (F).

- For economic action behavior, the students attain a mean of (43.10) and std. deviation of (26.48) which is a grade of (F).

- The score of political action behavior for the university of Bahrain students is (38.71) for the mean and (20.51) for std deviation which is in the range of (F) according to the university of Bahrain grading system.

- For the legal action behavior, the students obtained a mean of (36.96) and std deviation of (19.81).

In summary the university of Bahrain students performed badly on the environmental behavior scale both in total environmental behavior and on all the aspects of the environmental behavior.

#### 4.3.2.3 The environmental knowledge

Part three: what is the existing level of university of Bahrain students on the knowledge section?
To answer this question, the mean and Std. Deviation of the sample (n = 402) responses on the behavior scale has been calculated. Table (4) illustrates the results obtained:

Table (4)
Mean and Std. Deviation for Environmental knowledge level for the University of Bahrain student

| The field | Mean | Std. Deviation |
|---|---|---|
| Environmental knowledge | 33.85 | 13.76 |
| Ecological principles | 41.93 | 20.67 |
| Environmental issues and problems | 30.52 | 22.43 |
| Knowledge of Environmental issue investigation and action strategies. | 23.04 | 21.78 |

Table (4) shows the following results:

The students' performance on the knowledge scale is very low. The students attain a total knowledge mean of (33.85) and std deviation of (13.76) which is in the range of (F). table (4) shows the following details:

- The students mean of knowledge of ecological foundations is (41.93%) and the std is (20.68) which is (F) on the university grading system.
- With regards to the knowledge of environmental issues and problems, the students mean is (30.52) and the std deviation is (22.43) putting it in the (F) range.
- On the knowledge of Knowledge of Environmental issue investigation and action strategies, the students mean is (23.04) and the std is (21.78)

To summarize, the students' performance on the knowledge scale is very low and the students perform badly on all aspects of the environmental knowledge.

#### 4.3.2.4 The environmental literacy index:

To answer this question, the mean and Std. Deviation of the sample (n=402) responses on the behavior scale has been calculated. Table no. (5) Illustrates the results obtained:

Table (5)
Mean and Std. Deviation for Environmental literacy level for the University of Bahrain student

| The field | Mean | Std. Deviation |
|---|---|---|
| Environmental literacy index | 43.94 | 6.56 |

- Table (5) shows that the composite of the three sections of the environmental components of the university students is very low and it is in the (F) range.

### 4.3.3 Summary of the results of question one

The undergraduate students of the University of Bahrain perform very low on all aspects of the environmental literacy with the environmental literacy index firmly in the (F) range. The highest grade of the students was on the attitudes scale with mean of (58.22) and std deviation of (8.43); it is followed by the behavioral scale with mean of (39.76) and std deviation of (9.33). The lowest grade of them all was of the knowledge section in which the university students obtained a mean of (33.85) and std deviation of (13.76).

According to these results, hypothesis one which states that the students would perform badly on all the major components of environmental literacy has been substantiated.

### 4.4 research question two:

Is there any relationship between the environmental literacy components for the undergraduate students of the University of Bahrain?

### 4.4.1 Hypothesis two:

Based on literature review the following hypothesis can be made regarding the extent of the correlation between the major environmental literacy components:
Knowledge and attitude would correlate at least moderately if not strongly
Knowledge and behavior would correlate weakly
Attitude should at least correlate moderately to behavior

### 4.4.2 The results

To answer this question, the Pearson correlation coefficient between the major environmental literacy components has been calculated. The following table shows the result of the correlation

Table (6)
Pearson Correlations between Environmental knowledge and Environmental Attitude and Environmental behavior among Bahrain University Student

| The field | Environmental Attitude | Environmental behavior |
|---|---|---|
| Environmental knowledge | 0.421** | 0.021 |
| Environmental Attitude | | 0.312** |
| Environmental behavior | | |

** Correlation is significant at the 0.01 level (2-tailed).

Table (6) shows this result:

- There is a strong positive correlation between Environmental knowledge and Environmental Attitude (r=421) which means the increase in environmental knowledge is complemented by increase in environmental attitudes.

- There is weak correlation between Environmental knowledge and Environmental behavior (r=0.021).

- There is a strong positive correlation between Environmental behavior and Environmental Attitude (r=0.312) which means students with higher attitudes would be involved more in environmentally responsible behavior than those with lower attitudes.

For the first part of my hypothesis which states that Knowledge and attitude would correlate at least moderately if not strongly, the result of the study substantiates it.

The second part which states that Knowledge and behavior would correlate weakly also has been substantiated by the results shown in the table number (6).The third part which describes the relationship between attitude and behavior has been also substantiated.

### 4.2.3 Summary of question number two

Pearson correlation has been used to determine the relation between the major components of environmental literacy. The correlation between the knowledge and the attitudes was strong; the correlation between the behavior and attitudes was moderate and no correlation between the knowledge and the behavior.

### 4.5 Research question three:

Is there a measurable difference in the subpopulations (gender, class standing and age) scores on the three sections and total score?

### 4.5.1 Hypothesis three

There is a significant difference in the undergraduate subpopulations' performance at the University of Bahrain.

### 4.5.2 The results:

The subpopulation analysis consists of four parts which are: the performance of environmental literacy according to gender, sex, age and class standing.

#### 4.5.2.1 The level of environmental literacy according to the gender's variable

**Attitudes:**

To measure the level of the environmental attitudes according to the gender variable, the mean, Std. Deviation and the "t" test variable has been calculated. Table (7) illustrates the results obtained:

Table (7)

Mean and Std. Deviation and "t" test for Environmental Attitude for the student of the University of Bahrain according to gender

| The field | Sex | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental Attitude | male | 209 | 58.16 | 7.82 | -.144 | .886 |
| | female | 193 | 58.29 | 9.05 | | |
| Environmental sensitivity | male | 209 | 74.80 | 17.56 | **-5.947** | **.001** |
| | female | 193 | 84.20 | 12.13 | | |
| Prevention and Remediation of Environmental Problems and Issues | male | 209 | 57.30 | 9.23 | .839 | .402 |
| | female | 193 | 56.41 | 11.21 | | |
| Locus of control | male | 209 | 46.24 | 21.20 | 1.586 | .886 |
| | female | 193 | 42.70 | 21.86 | | |

Table (7) shows these results:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental Attitude among University of Bahrain student according to gender.

- There is Significant difference ($\alpha$=0.05) in the level of Environmental sensitivity according to sex in favor of the females who obtain a mean of (84.20), while males obtain a mean (74.80).
- There is no significant difference ($\alpha$=0.05) in the level of prevention and remediation of Environmental problems and issues according to sex.
- There is no significant difference ($\alpha$=0.001) in the level locus of control according to sex

To summarize, there is no significant difference on the general attitude scale in relation to the gender variable. However, there is a significant difference between the genders in favor of female students on their attitudes toward environmental sensitivity.

**Behavior:**

To measure the environmental behavior according to gender variable, the mean, Std. Deviation and the "t" test for the entire behavior scale and its subsections has been calculated. Table (8) illustrates the results obtained:

Table (8)

Mean and Std. Deviation and "t" test for Environmental behavior for the student of the University of Bahrain according to gender

| The field | Sex | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental behavior | male | 209 | 41.45 | 8.60 | **3.702** | **.001** |
| | female | 193 | 37.92 | 9.75 | | |
| Ecomanagement behavior | male | 209 | 41.90 | 14.84 | **3.347** | **.001** |
| | female | 193 | 36.80 | 14.50 | | |
| Persuasion behavior | male | 209 | 42.03 | 15.44 | **3.272** | **.001** |
| | female | 193 | 36.69 | 15.99 | | |
| Economic action behavior | male | 209 | 42.75 | 21.29 | **3.702** | **.001** |
| | female | 193 | 43.49 | 31.19 | | |
| Political action behavior | male | 209 | 38.99 | 18.71 | **3.347** | **.001** |
| | female | 193 | 38.41 | 22.35 | | |
| Legal action behavior | male | 209 | 39.90 | 19.01 | **3.272** | **.001** |
| | female | 193 | 33.78 | 20.22 | | |

Table (8) show this result

- There is significant difference ($\alpha$=0.001) in the level of Environmental behavior according to sex in favor of the male subpopulation who obtain a mean of (41.45), while female subpopulation gain a mean of (37.92).

- There is significant difference ($\alpha$=0.001) in the level of Ecomanagement behavior according to sex in favor of the male
- subpopulation who obtain a mean of (41.9041), while the female subpopulation obtain a mean of ( 36.7978).
- There is significant difference ($\alpha$=0.001) in the level of persuasion behavior according to sex in favor of the male subpopulation who obtain a mean of (42.03), while the female subpopulation achieved a mean of (36.69).
- There is significant difference ($\alpha$=0.001) in the level of economic action behavior according to sex in favor of the female subpopulation who obtain a mean of (43.49), while the male subpopulation obtain a mean of (42.75).
- There is significant difference ($\alpha$=0.001) in the level of political action behavior according to sex in favor of the male subpopulation who obtain a mean of (38.99), while the female subpopulation obtain a mean of (38.41).
- There is significant difference ($\alpha$=0.001) in the level of legal action behavior according to sex in favor of the male subpopulation who obtain a mean of (39.90), while the female subpopulation obtain a mean of (33.78).

In brief there is a significant difference between the genders in favor of male students on the general behavior scale. This trend is reflected through all subsections of the behavior scale except that of economic action behavior on which the difference is in favor of female students.

**Knowledge:**

To answer this question, the mean, Std. Deviation and the "t" test for the entire behavior scale and its subsections according to the gender variable has been calculated. Table (9) illustrates the results obtained

Table (9)

Mean and Std. Deviation and "t" test for Environmental knowledge for the student of the University of Bahrain according to gender

| The field | Sex | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental knowledge | male | 209 | 34.33 | 13.90 | .700 | .484 |
| | female | 193 | 33.33 | 13.63 | | |
| Ecological principles | male | 209 | 41.30 | 19.90 | -.611 | .542 |
| | female | 193 | 42.61 | 21.50 | | |
| Environmental issues and problems | male | 209 | 33.16 | 22.42 | **2.371** | **.018** |
| | female | 193 | 27.67 | 22.15 | | |
| Knowledge of Environmental issue investigation and action strategies. | male | 209 | 23.32 | 21.66 | .249 | .804 |
| | female | 193 | 22.75 | 21.96 | | |

Table (9) shows these results:

- No significant difference ($\alpha$=0.05) in the level of Environmental knowledge according to sex.
- No significant difference ($\alpha$=0.05) in the level knowledge in the Ecological principles according to sex.
- No significant difference ($\alpha$=0.001) in the level knowledge with Environmental issue investigation and action strategies according to sex.
- There is a significant difference ($\alpha$=0.05) in the level knowledge of Environmental issues and problems according to sex in favor of the male subpopulation who obtain a mean of (33.16), while the female subpopulation obtain a mean of (27.67).

To summarize the result above, there is no significant difference between the two sexes on the general knowledge scale. The only significant difference in the knowledge subsection is in the level knowledge of Environmental issues and problems in favor of male students.

**Environmental literacy index**

To measure the level of the environmental literacy according to gender variable, the mean, Std. Deviation and the "t" test variable has been calculated. Table (10) illustrates the results obtained:

Table (10)

Mean and Std. Deviation and "t" test for Environmental literacy for the student of the University of Bahrain according to gender

| The field | Sex | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental literacy | male | 209 | 44.65 | 6.48 | 2.152 | 0.032 |
| | female | 193 | 43.18 | 6.66 | | |

Table (10) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental literacy according to sex.

### 4.5.2.2 The level environmental literacy according to the age variable

**Attitude:**

To measure the level of the environmental attitudes according to age variable, the mean, Std. Deviation and the "t" test variable has been calculated. Table no.(11) illustrates the results obtained:

Table (11)

Mean and Std. Deviation and "t" test for Environmental attitude for the student of the University of Bahrain according to age

| The field | Age | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental Attitude | under 20 | 286 | 57.91 | 8.18 | -1.116 | .265 |
| | more than 20 | 116 | 58.99 | 8.99 | | |
| Environmental sensitivity | under 20 | 286 | 78.83 | 16.43 | -.909 | .364 |
| | more than 20 | 116 | 80.49 | 14.48 | | |
| Prevention and remediation of Environmental problems and issues | under 20 | 286 | 56.57 | 10.05 | -.902 | .368 |
| | more than 20 | 116 | 57.62 | 10.65 | | |
| Locus of control | under 20 | 286 | 44.36 | 21.68 | -.247 | .805 |
| | more than 20 | 116 | 44.97 | 21.37 | | |

Table (11) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental Attitude according to age.
- There is no significant difference ($\alpha$=0.05) in the level of environmental sensitivity according to age.

- There is no significant difference ($\alpha$=0.05) in the level of prevention and remediation of Environmental problems and issues according to age.
- There is no significant difference ($\alpha$=0.001) in the level locus of control according to age

There is no significant difference on the general attitudes scale according to the age variable. A trend repeated in all subsections of the environmental attitudes.

**Behavior:**

To measure the environmental behavior according to age variable, the mean, Std. Deviation and the "t" test for the entire behavior scale and its subsections has been calculated. Table (12) illustrates the results obtained:

Table (12)

Mean and Std. Deviation and "t" test for Environmental behavior for the student of the University of Bahrain according to age

| The field | Age | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental behavior | under 20 | 286 | 39.75 | 9.73 | -.032 | .974 |
| | more than 20 | 116 | 39.78 | 8.29 | | |
| Ecomanagement behavior | under 20 | 286 | 39.89 | 15.17 | .888 | .375 |
| | more than 20 | 116 | 38.38 | 14.14 | | |
| persuasion behavior | under 20 | 286 | 39.18 | 15.91 | -.551 | .582 |
| | more than 20 | 116 | 40.19 | 15.98 | | |
| economic action behavior | under 20 | 286 | 43.52 | 29.60 | .485 | .628 |
| | more than 20 | 116 | 42.06 | 16.48 | | |
| political action behavior | under 20 | 286 | 37.64 | 20.72 | -1.583 | .114 |
| | more than 20 | 116 | 41.35 | 19.83 | | |
| legal action behavior | under 20 | 286 | 37.03 | 20.42 | .100 | .920 |
| | more than 20 | 116 | 36.80 | 18.32 | | |

Table (12) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental behavior according to age.

- There is no significant difference ($\alpha$=0.05) in the level of ecomanagement behavior according to age.
- There is no significant difference ($\alpha$=0.05) in the level of persuasion behavior according to age.
- There is no significant difference ($\alpha$=0.05) in the level of economic action behavior according to age.
- There is no significant difference ($\alpha$=0.05) in the level of political action behavior according to age.
- There is no significant difference ($\alpha$=0.05) in the level legal action behavior according to age

There is no significant difference on the general behavior scale according to the age variable. A trend repeated in all subsections of the environmental behaviors.

**Knowledge**

To measure the environmental knowledge according to age variable, the mean, Std. Deviation and the "t" test for the entire behavior scale and its subsections has been calculated. Table no. (13) Illustrates the results obtained

Table (13)

Mean and Std. Deviation and "t" test for Environmental knowledge for the student of the University of Bahrain according to age

| The field | Age | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental knowledge | under 20 | 286 | 33.79 | 13.93 | -.146 | .884 |
| | more than 20 | 116 | 34.02 | 13.39 | | |
| ecological principles | under 20 | 286 | 41.61 | 20.97 | -.469 | .640 |
| | more than 20 | 116 | 42.72 | 19.96 | | |
| Environmental issues and problems | under 20 | 286 | 31.34 | 21.80 | 1.105 | .270 |
| | more than 20 | 116 | 28.50 | 23.90 | | |
| knowledge of Environmental issue investigation and action strategies. | under 20 | 286 | 22.54 | 21.44 | -.705 | .481 |
| | more than 20 | 116 | 24.30 | 22.64 | | |

Table (13) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental knowledge according to age.
- There is no significant difference ($\alpha$=0.05) in the level of ecological principles according to age.
- There is no significant difference ($\alpha$=0.05) in the level of Environmental issues and problems according to age.
- There is no significant difference ($\alpha$=0.05) in the level of knowledge with of Environmental issue investigation and action strategies according to age.

There is no significant difference on the general knowledge scale according to the age variable. A trend repeated in all subsections of the environmental knowledge.

**Environmental literacy index**

To measure the environmental behavior according to age variable, the mean, Std. Deviation and the "t" test for the entire behavior scale and its subsections has been calculated. Table (14) illustrates the results obtained:

Table (14)

Mean and Std. Deviation and "t" test for Environmental literacy among Bahrain University student according to age

| The field | Age | n | Mean | Std. Deviation | t | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Environmental literacy | under 20 | 286 | 43.81 | 6.67 | -0.591 | 0.555 |
| | more than 20 | 116 | 44.26 | 6.43 | | |

Table number (14) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of prevention and remediation of Environmental problems and issues according to age.

#### 4.5.2.3 The level of environmental literacy according to class standing

The following table illustrates the mean and the std deviation of the university of Bahrain undergraduate students according to class standing.

Table (15)

The mean and std scores of environmental literacy level according to college variable

| Class standing | n | Attitude | | Behavior | | Environmental knowledge | | Environmental literacy | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std deviation | Mean | Std deviation | Mean | Std deviation | Mean | Std deviation |
| First | 137 | 57.91 | 8.79 | 39.34 | 10.43 | 34.80 | 13.92 | 44.00 | 7.08 |
| Second | 187 | 58.32 | 8.03 | 39.76 | 8.74 | 32.90 | 13.81 | 43.60 | 6.38 |
| Third | 55 | 58.56 | 9.06 | 41.30 | 9.08 | 34.70 | 14.06 | 44.80 | 6.52 |
| Forth | 23 | 58.41 | 8.27 | 38.41 | 7.36 | 33.00 | 11.82 | 43.20 | 5.58 |

Table 15 shows the following results:

- The highest performance on the general attitudes scale was achieved by the third year students who achieved a mean of (58.56) and std deviation of (9.06) while the lowest was achieved by the first year students who obtained a mean of (57.9) and std deviation of (8.79).
- The highest performance on the general behavior scale was achieved by the third year students who achieved a mean of (41.30) and std deviation of (9.08) while the lowest was achieved by the forth year students who obtained a mean of (38.41) and std deviation of (7.36).
- The highest performance on the general knowledge scale was achieved by the first year students who achieved a mean of (34.80) and std deviation of (13.92) while the lowest was achieved by the second year students who obtained a mean of (32.90) and std deviation of (13.81).
- The highest performance on the environmental literacy scale was achieved by the third year students who achieved a mean of (44.89) and std deviation of (6.52) while the lowest was achieved by the forth year students who obtained a mean of (43.28) and std deviation of (5.58).

**Attitudes:**

To measure the environmental behavior according to class standing variable, One-Way ANOVA analysis for the entire attitude scale and its subsections has been calculated. Table (16) illustrates the results obtained:

Table (16)

One-Way ANOVA for Environmental Attitude for the students of the University of Bahrain according to class standing

| The field | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Environmental Attitude | Between Groups | 20.535 | 3 | 6.845 | .096 | .962 |
| | Within Groups | 26249.786 | 398 | 71.525 | | |
| | Total | 26270.320 | 401 | | | |
| Environmental sensitivity | Between Groups | 621.692 | 3 | 207.231 | .820 | .484 |
| | Within Groups | 92790.538 | 398 | 252.835 | | |
| | Total | 93412.230 | 401 | | | |
| Prevention and remediation of Environmental problems and issues | Between Groups | 15.706 | 3 | 5.235 | .050 | .985 |
| | Within Groups | 38666.018 | 398 | 105.357 | | |
| | Total | 38681.724 | 401 | | | |
| locus of control | Between Groups | 1160.612 | 3 | 386.871 | .831 | .478 |
| | Within Groups | 170911.491 | 398 | 465.699 | | |
| | Total | 172072.102 | 401 | | | |

Table (16) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental Attitude according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of prevention and remediation of Environmental problems and issues according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of prevention and remediation of Environmental problems and issues according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level locus of control according to class standing.

There is no significant difference on the general attitudes scale according to the class standing variable. A trend repeated in all subsections of the environmental attitudes.

**Behavior**

To measure the environmental behavior according to the class standing variable, One-Way ANOVA analysis for the entire attitude scale and its subsections has been calculated. Table (17) illustrates the results obtained:

Table (17)

One-Way ANOVA for Environmental behavior for the students of University of Bahrain student according to class standing

| The field | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Environmental behavior | Between Groups | 182.2 | 3 | 60.735 | .696 | .555 |
| | Within Groups | 32023.7 | 398 | 87.258 | | |
| | Total | 32205.9 | 401 | | | |
| ecomanagement behavior | Between Groups | 1070.0 | 3 | 356.677 | 1.619 | .185 |
| | Within Groups | 80872.6 | 398 | 220.361 | | |
| | Total | 81942.6 | 401 | | | |
| persuasion behavior | Between Groups | 1446.3 | 3 | 482.097 | 1.918 | .126 |
| | Within Groups | 92229.6 | 398 | 251.307 | | |
| | Total | 93675.9 | 401 | | | |
| economic action behavior | Between Groups | 701.5 | 3 | 233.828 | .332 | .802 |
| | Within Groups | 258670.7 | 398 | 704.825 | | |
| | Total | 259372.2 | 401 | | | |
| political action behavior | Between Groups | 2731.2 | 3 | 910.385 | 2.184 | .090 |
| | Within Groups | 152973.0 | 398 | 416.820 | | |
| | Total | 155704.2 | 401 | | | |
| legal action behavior | Between Groups | 647.7 | 3 | 215.909 | .548 | .650 |
| | Within Groups | 144557.0 | 398 | 393.888 | | |
| | Total | 145204.7 | 401 | | | |

Table (17) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental behavior according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of ecomanagement behavior according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of persuasion behavior according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of economic action behavior according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of political action behavior according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level legal action behavior according to class standing.

There is no significant difference on the general behavior scale according to the class standing variable. A trend repeated in all subsections of the environmental behaviors.

**Knowledge:**

To measure the environmental knowledge according to the class standing variable, One-Way ANOVA analysis for the entire knowledge scale and its subsections has been calculated. Table (18) illustrates the results obtained:

Table (18)

One-Way ANOVA for Environmental knowledge for the students of University of Bahrain student according to class standing

| The field | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Environmental knowledge | Between Groups | 302.1 | 3 | 100.703 | .530 | .662 |
| | Within Groups | 69774.9 | 398 | 190.122 | | |
| | Total | 70077.0 | 401 | | | |
| ecological principles | Between Groups | 1194.7 | 3 | 398.217 | .932 | .425 |
| | Within Groups | 156855.8 | 398 | 427.400 | | |
| | Total | 158050.5 | 401 | | | |
| Environmental issues and problems | Between Groups | 615.3 | 3 | 205.087 | .406 | .749 |
| | Within Groups | 185557.2 | 398 | 505.606 | | |
| | Total | 186172.5 | 401 | | | |
| Knowledge of Environmental issue investigation and action strategies. | Between Groups | 307.0 | 3 | 102.335 | .214 | .886 |
| | Within Groups | 175151.2 | 398 | 477.251 | | |
| | Total | 175458.2 | 401 | | | |

Table number (18) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of Environmental knowledge according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of ecological principles according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of Environmental issues and problems according to class standing.
- There is no significant difference ($\alpha$=0.05) in the level of knowledge with of Environmental issue investigation and action strategies according to class standing.

There is no significant difference on the general knowledge scale according to the class standing variable. A trend repeated in all subsections of the environmental attitudes.

**Environmental literacy index**

To measure the environmental literacy according to the class standing variable, One-Way ANOVA analysis for the environmental literacy scale has been calculated. Table no. (19) Illustrates the results obtained:

Table (19)

One-Way ANOVA for Environmental literacy for the students of University of Bahrain student according to class standing

| The field | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Environmental literacy | Between Groups | 65.617 | 3 | 21.872 | .500 | .682 |
| | Within Groups | 16041.802 | 398 | 43.711 | | |
| | Total | 16107.419 | 401 | | | |

Table number (19) shows this result:

- There is no significant difference ($\alpha$=0.05) in the level of environmental literacy according to class standing.

**4.5.3 Summary to question three**

To investigate question three, the researcher has used the "t" and "ANOVA" tests to find if the presence of significant difference between the subpoulations; and here is a summary of the results

There is no significant difference on the general attitude scale in relation to the gender variable except in environmental sensitivity where the significant difference between the genders is in favor of female students.

The picture is different in case of behavior where is significant difference between males and females in favor of males except in the economic action behavior.

In the knowledge part, there is also no significant difference between the two sexes except in the knowledge Environmental issues and problems in favor of male students.

The same result also can be seen on the environmental literacy index where no difference between the two genders.

The same result was obtained for the age and class standing variables.

Hypothesis three has been substantiated partially in case of environmental behavior only.

# Chapter five

# Discussion

## 5.1 The environmental literacy at the University of Bahrain

### 5.1.1 The level of environmental attitudes:

Although the general performance on the attitude scale was very low, the students have demonstrated diversity toward the different aspects of environmental attitudes.

Their sensitivity toward the environment which includes their attitudes toward loving and enjoying the environment was relatively high, scoring near the (B) grade. Indeed this is the highest point the student of the University of Bahrain achieved in the whole of the environmental literacy scale. It shows a high readiness on behalf of the students to learn about and for the environment, a fact on which the university should capitalize and introduce an environmental literacy programs.

In the second part of the attitude section which includes the students' attitude toward environmental issues such as environmental legislations and its effect on the economic growth, land allocation and on personnel freedom, the students' performance was low. In my opinion this may be related to the fear of unemployment and the housing crisis here in Bahrain.

This result may show unawareness on behalf of the students because the industrial and economic growth can go hand in hand with the protection of the environment which is indeed the essence sustainable development.

The third part which deals with how much control people feel they have over environmental issues and to what extent their individual actions matter which is called locus of control. Their achievement was very low and; it shows that the students are not certain about the effectiveness of their individual contributions, or their role in influencing others. This trend should reverse with the adoption of democracy in the country where legislatures are elected by the citizens.

The attitude ranks first in the environmental literacy components. This is consistent with many studies carried out on environmental literacy components. In a survey conducted at the Mount Holyoke College, the students' attitude achievement was the highest amongst the environmental literacy components (Monosson, 2003). The same result was repeated at a study carried out to measure environmental literacy in high

Schools of Florida (Bogan and Kromrey, 1996 ), Wisconsin (Champeau et al, 1997 ) and the adult citizens of Pennsylvania(Johnson et al, 2000 ) to mention but few.

However the low score obtained by the university students is inconsistent with many studies measuring the environmental literacy components. Many studies have shown a higher attitudes performance. For example, at the Mount Holyoke College the mean of the students on the attitude scale was 85 % (Monosson, 2003) and 75.5 % at Florida high schools (Bogan and Kromrey, 1996 ) to mention but few.

As it appears in the literature review, environmental knowledge is a prerequisite for positive environmental attitudes. The poor result of environmental attitudes maybe directly linked to the bad performance achieved by the students on the knowledge scale.

**5.1.2 The level of environmental behavior:**

Similar to the attitude score, the score of environmental behavior is low as well.

It is firmly in the (F) range. The highest score achieved in the behavior section was in the Economic action behavior which describes the purchasing style of the students. The lowest was in the field of Legal action behavior which describes the action taken by the students if they notice any unlawful environmental act. The rest of the environmental behavior subsections which describe the action taken by the students in EcoManagement , Persuasion, Political action show close results.

Besides having low score on the attitudes scale, the very low performance of the students may be related to a number of factors. These include the extreme weather in Bahrain which may prohibit people in many times of the year to take even a simple walk. Another reason is the unreliableness of public transport. In addition the lack of facilities that promote environmentally friendly behavior such as the facilities and programs of recycling may be another factor. A fledgling democracy that has recently begun may be a factor in supporting the candidates who supports the environmental causes.

These factors are possible factors and more research is needed to verify or deny them.

The students' achievement on the behavior scale followed the attitude and precedes the knowledge performance. This is unusual because in many studies the researcher has investigated the lowest performance is in the behavior section of the environmental literacy (Monosson, 2003,Bogan and Kromrey 1996, Champeau et al, 1997).

It is also unusual in its very low score. In many studies, students around the world achieved better than the university students in the behavior section. For example, at

the Mount Holyoke College the mean of the students on the behavior scale was 61 % (Monosson, 2003), and 56.7 % at Florida high schools (Bogan and Kromrey, 1996).
As discussed in the literature review, the environmental responsible behavior is a function of the attitude intentions and the relatively low performance of students on the attitude scale may have led to this poor result.

### 5.1.3 The level of environmental knowledge:

The students perform badly on the knowledge scale. Indeed it is the lowest of the environmental literacy components. However there is variation in their knowledge about the different aspects of the environmental knowledge. The highest score on the environmental knowledge scale was in the Ecological principles and the lowest was their knowledge about Environmental issue Investigation and Action Strategies.
The main reason for this low grade on knowledge scale may be because of lack of environmental literacy programs that teach the undergraduate students about the environment and sustainable development.
The general trend observed in the studies carried out worldwide is a low knowledge score but not as low as that of the University of Bahrain Students' achievement (33.85%). In the study carried out in Mount Holyoke College the mean of the students was 61 % while in Florida high school it was much lower at (36.7%)
The low achievement of the students on the knowledge scale may contribute strongly to the low performance of the students on both the attitudes and on the behavior scales.

### 5.1.4 The level of environmental literacy index:

The poor results in all the major components of the environmental literacy reflected badly on the composite index. The end result of environmental literacy index was very low.

## 5.2 The correlation:

The intension behind the analysis of the correlation between the major components of the environmental literacy is to see whether the popular belief that increasing the learners' knowledge will lead to positive attitudes toward the environment which will eventually lead to a responsible environmental behavior.

In other words, the correlation analysis will look at whether the knowledge will mediate attitudes which in turn will be translated into environmentally responsible behavior which is the desired outcome of the environmental literacy . The correlation analysis found in this study can be represented diagrammatically as follows Figure 5.

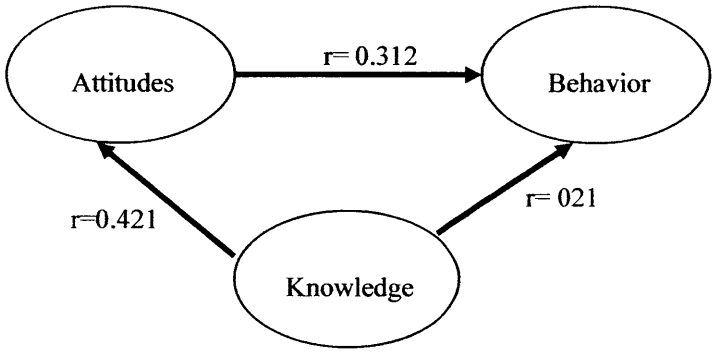



Figure-5. The result of the correlation between the environmental knowledge components

The result shows that there is strong correlation between the knowledge component of the environmental literacy and the attitudes while there is a moderate correlation between attitudes and behavior. The result is similar to many studies conducted in this field and already mentioned in the literature review. It confirms the belief that by increasing the knowledge we will have a leaner with positive attitudes, which will lead to environmentally responsible behaviors. Based on the result of the correlation analysis, the following diagram can be drawn.

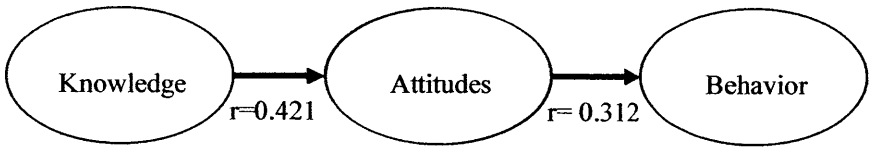



Figure 6. The correlation model deduced from the study

This model can be used by the university to devise any future environmental literacy program at the university. That is to say instructing the students about the environmental factual knowledge will not translate automatically into the preferable outcome, which is a student with behavior that does not endanger the environment and

its delicate systems. When the university decides to build an environmental literacy curriculum, it should give equal emphasis to building their attitudes, which in turn would translate into environmentally responsible behavior.

### 5.3The subpopulation analysis:

### 5.3.1 Analysis of subpopulation according to gender:

**Attitudes:**

The results showed that there is no significant difference between the two sexes at the University of Bahrain on the general scale of attitudes with the female subpopulation scoring a slightly higher score than their male counter parts. This result is reflected in both in the level of the prevention and remediation of Environmental problems and issues and the locus of control.

. However the result showed there is significant difference in performance on the environmental sensitivity between the females and males in favor of females.

However, this lack of significant difference between the two genders on the general attitudes scale is inconsistent with many studies conducted on the relation between the gender and the concern about the environment which found that there is strong relation between the environmental concern and the gender in favor of females. These studies include a study by Connell et al. (1998), Clarke(1996), and Hampel et al. (1996) to mention but few.

**Behavior:**

The results obtained from the university of Bahrain undergraduate students showed that there is significant difference in the behavior section in favor of males. This was reflected in all subsections of the behavior section except that of the economic action behavior.

The result is contradictory to several studies the researcher has found. In a study conducted by Connell et al (1998), they found that female students were more regularly and more extensively involved in behaviors to improve environmental quality.

This finding was supported by a study conducted by Morris and Schagen (1996) which found that girls had significantly higher scores than boys for individual environmental behaviors.

Furthermore, in a survey undertaken by Roper Starch Worldwide (1994), it was found that "gender is a key factor in five out of the top six environmentally-friendly behaviors".

**The knowledge:**

There is no significant difference between the genders in the knowledge section or in its subsections with male scoring higher then than female subpopulation.
The studies in literature showed mixed results concerning the relation between the gender and the performance on the knowledge scale. For example, Gambro and Switzky (1999) found that males performed better on the knowledge scale while Connell et al. (1998) found that "female students had stronger conceptual knowledge than male students".

**The environmental literacy score**:

There is no significant difference on the scale of environmental literacy according to sex. The female students scored lower than their male colleagues.

### 5.3.2 Analysis of subpopulation according to the age

**Attitudes**:
No significant difference on the general scale of attitudes or in any of its subsections with students 20 years or younger scoring lower than the students who are 20 years or over.
This finding contradicts the belief in the literature where the age is a predictor of the environmental attitudes (Volsky, 1999).
Many studies support this belief including that of Tuna (1998), Australian bureau of statistics (Yenken et al, 2004) and Kaltenborn & Bjerke (2002) to mention but few.

**Behavior:**

No significant difference has been found between the students according to the age variable on the behavior scale. Students of 20 years and younger score almost the same as the students who are older. Similar to the attitudes, age is a predictor of behavior; and not finding any significant difference between the age groups may be related to the closeness of the age group i.e a span of about four years.

**The knowledge**

The environmental knowledge according to the age variable has similar results to the behavior and the attitudes scales. No significant difference has been found between the two age groups on the environmental knowledge with the students over 20 years scoring higher.

This result is inconsistent with a number of studies the researcher found that include Minnesota report card (Minnesota, 1999) and a study conducted by The American National Environmental Education and Training Foundation (NEETF) on environmental literacy in the United States.

**The environmental literacy index**:

There is no significant difference between the two age groups.

The result is very difficult to explain because it could be supposed that as the students spend more time at the university they would gain more knowledge, which should be translated into a positive attitudes and behavior.

### 5.3.3 Analysis of subpopulation according to the class standing:

**Attitudes**:

The results show that there is no significant difference between the different class years on the attitudes scale. The students of the third year scored the highest while the first year students scored the lowest score.

The result is consistent with the only study the researcher found that discusses the link between the attitudes and the academic orientation and abilities. Morris and Schagen (1996) found that there is no statistically significant relationship between students' ability and their level of environmental concern.

**Behavior:**

There is no significant difference between the university students according to class standing on the behavior scale. The highest score is achieved by the third year students while the lowest was achieved by the forth year students.

The result of the lack of significant difference between the university students according to class standing on the behavior scale is an unfortunate one. It could be assumed safely that if the university is engaged in environmental problems its students would perform better with the advancement of their class standing. This fact is

reflected in a number of studies including that of Kuhlemeier et al (1999), Roper Starch Worldwide (1994) and Morris & Schagen (1996).

**The knowledge**

Similar to the results on the attitudes and behavior scales, there is no significant difference between the students according to the class standing variable on the knowledge scale. The highest grade was achieved by the first year students while the lowest was achieved by the second year students.

As with the behavior, it could be assumed safely that with the advancement of class at the university, the students should be more exposed to the environmental concepts which in turn would enhance their performance on the knowledge scale. Many studies support this assumption including that of Kuhlemeier et al (1999), Roper Starch Worldwide (1994) and Gambro &
Switzky (1999).

**The environmental literacy index**:

There is no significant difference between the university students according to class standing on the environmental literacy index scale. The highest score is achieved by the third year students while the lowest was achieved by the forth year students.

The result is difficult to explain because it could be safely said that as the students go higher in their studies they would become more exposed to the environmental knowledge and consequently their attitudes would be more positive and their behavior would be more environmentally friendly.

## 5.4 Conclusion:

Sustainable development is a concept that was developed in the late eighties. Since then it gains much publicity and popularity because it gives a framework for social justice while at the same it encourages the conservation of the environment and the expansion of the world's economies. In the kingdom of Bahrain there are many major challenges to sustainable development most of them revolve around the environment. This makes the protection of the environment a priority that must be pursued. One of the most important tools to protect the environment goes through the enlightenment of citizens about the dangers facing the environment and here comes the vital role played by the environmental education. Environmental education should infiltrate all stages of education and it should not be confined to one educational stage. Especially vital to the society is the awareness of the undergraduate students who soon would become the professionals in all walks of life and whose decisions would effect the environment deeply both directly and indirectly. This fact made environmental education a necessity rather than choice. But what about our national university the most important of all universities in Bahrain -historically and at present- is it fulfilling its obligation in rising a generation that is aware of the environmental challenges around them. This idea was behind this thesis. The researcher has surveyed the environmental culture at the University of Bahrain and the level of environmental literacy among its undergraduate students. Unfortunately the researcher has discovered that the university should do a lot to line its practices with that of the protection of the environment. on the other hand the researcher has developed a questionnaire to measure the environmental literacy among the undergraduate students. The researcher found that the students should be more a ware of the environmental problems that surround them, they should be more concerned about the environment; and they have to take further actions to protect the environment.

The researcher has found an uncommon equality between the two genders of the university regarding the knowledge about and attitude towards the environment. the researcher found there is a strong correlation between knowledge and attitudes, moderate correlation between attitudes and behavior and weak correlation between the knowledge and behavior a fact that highlight the idea that only filling the brains of the students with knowledge would not necessarily translates into environmental action.

The researcher hopes that the university would befit from this study and take his recommendations into consideration.

## Recommendations:

Based on the results and discussion in this thesis, the researcher recommends the following:

1. The university should make the environmental literacy a priority and include the promotion of it in its mission statement.

2. The university should sign a treaty that encourage sustainable. development in the university such as Talloires Declaration.

3. Line itself with the environmental practices.

4. Make environmental literacy requirement to all degrees.

5. Encourage the activities in the environment.

6. Encourage research in the environment and sustainable development.

## Further studies:

Through out my investigation in the literature, the researcher has found many gaps in the body of knowledge concerning the environmental literacy in Bahrain. The research may be directed to the following studies:

1. Measuring the environmental literacy for the Bahraini society as a whole as it is already done in a number of countries.
2. Finding and comparing the environmental literacy level between the universities in Bahrain and in the wider region.
3. Finding the environmental literacy in the pre college school system.
4. Defining and estimating the factors such as media and the school system that influence the environmental literacy in Bahrain.
5. Measuring the effect of an intervention such as a program on the level of environmental literacy at the University of Bahrain.
6. Measuring the effect of an environmental literacy program on the correlation between the major components of the environmental literacy.
7. Measuring the effect of an intervention program on the correlation between the major components of the environmental literacy.

8. measuring the role played by the social institutions such as mosques and clubs in promoting the environmental literacy

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# Appendix- - A The list of referee and the letter addressed to them

A list of the names of referees who were asked to establish the validity of the survey instrument.

| The name | The position |
|---|---|
| Professor Khalil Shubbar | Professor of instruction and teaching methods at the University of Bahrain |
| Professor Mohamed Qandeel | Professor of instruction and teaching methods at the University of Bahrain |
| Professor Ahmed Yousef | Professor of environmental chemistry at the University of Bahrain |
| Dr. Jameel Abbas | Associate professor of environmental biology at the University of Bahrain |
| Dr. Ahmad Sa'ad Jalal | Associate professor of psychology at the University of Bahrain |
| Dr. A.Ellah S.Jawad Al-Wedaei | West Asia Regional director of the protection of ozone layer at the UNEP |
| Dr. Basil Al-Alian | From the UNEP office in Bahrain |
| Dr. Khatoon Hameed Sangoor | The former prime supervisor of science curriculum at the ministry of education in Bahrain |
| Dr. Fuad Qanboor | From the UNEP office |
| Dr. Isa Al-Wedaei | Assistant professor of arts at the University of Bahrain |

Dear Dr,

I am a graduate student at the University of Bahrain. My major is "environment and sustainable development" a master program administered by the college of scientific research. Currently I am writing my thesis about the environmental literacy at my university. To determine the environmental literacy for the under graduate students at the university of Bahrain, I decided to use Wisconsin environmental education framework developed by the Wisconsin center for environmental education as a basis to construct my survey.

The survey consists of three sections each measuring one aspect of the environmental literacy and they are the attitudes, behavior and the knowledge.

Can you check whether the statements and the questions in survey are related to the domain of interest and it is suitable for the undergraduate students.

Sir, you can delete or add any statement or question where you think appropriate.

Sir, Please find attached with this email the complete survey.

Thank you very much

# Appendix B- - the study instrument and the translation

# مقياس الاتجاهات نحو البيئة ومشكلاتها لطلاب وطالبات الشهادة الجامعية الأولى بجامعة البحرين

عزيزتي الطالبة – عزيزي الطالب:

أمامك مقياس مكون من مجموعة من العبارات التي تتعلق بالبيئة ومما تتعرض له من مشكلات ، وهذه العبارات يختلف الأفراد بشأنها فيما بينهم ، فلكل فرد رأيه الخاص فيها، إذ ليس هناك إجابة صحيحة وأخرى خاطئة ، فالإجابة تعتبر صحيحة طالما إنها تعبر عن رأيك فعلا فيها.

والمرجو منك قراءة كل عبارة بدقة، ثم توضيح رأيك فيها، وذلك بوضع علامة(✓) أمام تلك العبارة وتحت الخانة المناسبة ( موافق تماما، موافق، غير متأكد، غير موافق، غير موافق تماما)

**مثلا:**

لا أهتم بزيادة رقعة التصحر .

إذا كنت تشعر انك موافق تماما على العبارة فضع علامة(✓) أمام العبارة وتحت خانة موافق تماما

إذا كنت تشعر انك غير موافق على العبارة فضع علامة(✓) أمام العبارة وتحت خانة غير موافق

إذا كنت تشعر انك غير موافق تماما على العبارة فضع علامة(✓) أمام العبارة وتحت خانة غير موافق تماما

أما إذا كنت غير قادر على تحديد تجاه العبارة، بمعنى انك متردد بين الموافقة وعدم الموافقة، فعليك بوضع علامة(✓) أمام العبارة وتحت الخانة (غير متأكد).

مع خالص الشكر على صادق تعاونكم معنا.

| م | العبـــارات | موافق تماما | موافق | غير متأكد | غير موافق | غير موافق تماما |
|---|---|---|---|---|---|---|
| 1 | عندما أكون بالخارج لا أقوم بملاحظة الأشياء الطبيعية مثل الاشجار والازهار . | | | | | |
| 2 | لا أهتم بالقراءة عن البيئة. | | | | | |
| 3 | أعتقد بان الاهتمام بالمشاكل البيئية أمر مبالغ فيه. | | | | | |
| 4 | يجب أن لا تؤثر التشريعات والقوانين البيئية على النمو الصناعي والتنمية في المجتمع. | | | | | |
| 5 | يجب وضع المزيد من الضوابط على العمليات الصناعية والزراعية لحماية البيئة حتى لو ترتب عن ذلك ارتفاع أسعار الأشياء التي احتاج إلى شرائها. | | | | | |
| 6 | لا أهتم بزيادة رقعة التصحر . | | | | | |
| 7 | أعتقد بان القوانين البيئية الموجودة حاليا كافية لحمايتها . | | | | | |
| 8 | لا أعتقد بان عملية التدويرrecycling تستحق كل هذا العناء. | | | | | |
| 9 | يجب تخصيص المزيد من الأراضي للحياة الفطرية. | | | | | |
| 10 | اتابع بأهتمام زيادة حجم النفايات في هذا البلد. | | | | | |
| 11 | يجب سن القوانين وتنفيذها من اجل الحفاظ على مستقبل نوعية الحياة حتى لو اقتضى ذلك الحد من الحريات الشخصية. | | | | | |
| 12 | لا اهتم بمعدلات انقراض الأنواع في العالم. | | | | | |
| 13 | أشعر بالقلق من الأخطار الصحية الناجمة عن تلوث الماء والهواء. | | | | | |
| 14 | أعتقد أنه بإمكاني المساهمة في حل المشاكل البيئية . | | | | | |
| 15 | أجد صعوبة بالغة في إقناع زملائي بتغير سلوكهم البيئي حول الأشياء التي تساعد البيئة مثل التدوير | | | | | |

# Translation

Dear student,

The questionnaire which you are about to participate in composed of statements that evaluate your feelings toward the environment and its problems. There is no correct or wrong answer and the answer is correct as long it describes your feeling.

Please put ( √) in front of the statement and in the cell(strongly agree, agree, no opinion, disagree, strongly disagree) which closely describe your feelings toward the environment.

| No. | Statement | Strongly agree | disagree | No opinion | disagree | Strongly disagree |
|---|---|---|---|---|---|---|
| 1. | When I am outside, I usually don't notice the natural things around me like the flowers and the trees. | | | | | |
| 2. | I'm not interested in reading about the environment. | | | | | |
| 3. | I think most of the concern about environmental problems has been exaggerated. | | | | | |
| 4. | A community's environmental regulations should not interfere with industrial growth and development. | | | | | |
| 5. | More controls should be placed on industry and agriculture to protect the quality of the environment, even if it means that thing I purchase will cost more. | | | | | |
| 6. | I am not concerned about the fact that the world's deserts are increasing in size. | | | | | |
| 7. | There are already enough laws to protect the environment. | | | | | |
| 8. | I don't think that recycling is worth all the trouble it takes. | | | | | |
| 9. | More land should be set aside for wildlife habitats. | | | | | |
| 10 | I am concerned about how much waste is produced in this country. | | | | | |
| 11 | Laws should be passed and enforced that protect the quality of life in the future even if it means that individual freedoms are limited. | | | | | |
| 12 | I am not concerned about the rate of species extinction in the world. | | | | | |
| 13 | I am concerned about environmental health hazards such as those caused by air or water pollution. | | | | | |
| 14 | I believe that I can contribute to the solution of environmental issues by my actions. | | | | | |
| 15 | It's too hard to change my friends' minds about doing things to help the environment. | | | | | |

# مقياس السلوكيات نحو البيئة ومشكلاتها لطلاب وطالبات الدرجة الجامعية الأولى بجامعة البحرين

عزيزتي الطالبة – عزيزي الطالب:

أمامك مقياس مكون من مجموعة من السلوكيات التي تتعلق بالبيئة ومما تتعرض له من مشكلات ، وهذه العبارات يختلف الأفراد بشأنها فيما بينهم ، فلكل فرد رأيه الخاص فيها، إذ ليس هناك إجابة صحيحة وأخرى خاطئة ، فالإجابة تعتبر صحيحة طالما إنها تعبر عن رأيك فعلا فيها.

والمرجو منك قراءة كل عبارة بدقة، ثم توضيح درجة قيامك بهذا الفعل ، وذلك بوضع علامة(✓) أمام تلك العبارة وتحت الخانة المناسبة (دائما، متكرر كثيرا، احيانا ، لاافعله، لاافعله مطلقا)

مثلا:

اعمل جاهدا على تقليل استهلاكي للحاجيات.

إذا كنت تشعر انك موافق تماما على العبارة فضع علامة(✓) أمام العبارة وتحت خانة دائما

إذا كنت تشعر انك غير موافق على العبارة فضع علامة(✓) أمام العبارة وتحت خانة متكرر كثيرا

إذا كنت تشعر انك غير موافق تماما على العبارة فضع علامة(✓) أمام العبارة وتحت خانة لاافعله مطلقا

أما إذا كنت غير قادر على تحديد تجاه العبارة، بمعنى انك متردد بين الموافقة وعدم الموافقة، فعليك بوضع علامة(✓) أمام العبارة وتحت الخانة (احيانا).

مع خالص الشكر على صادق تعاونكم معنا.

| م | العبـــارات | دائما | متكرر كثيرا | احيانا | لافعل | لافعل مطلقا |
|---|---|---|---|---|---|---|
| 1 | عندما لا احتاج إلى المصابيح والأجهزة أطفئها للحفاظ على الكهرباء . | | | | | |
| 2 | أتكلم مع الأشخاص عندما ألاحظ عليهم القيام بأعمال تضر بالبيئة لأقنعهم بالإقلاع عنها. | | | | | |
| 3 | استخدم وسائل الموصلات العامة أو الدراجة الهوائية أو المشي بغرض الحفاظ على البيئة. | | | | | |
| 4 | أعمل جاهدا على تقليل استهلاكي للحاجيات. | | | | | |
| 5 | اعمل على أن أكون قدوة بيئية ايجابية لأصدقائي. | | | | | |
| 6 | ادعم المرشحين للمناصب السياسية الذين يهتمون بالقضايا البيئية ومشاكلها. | | | | | |
| 7 | عندما أشاهد علبة ألمونيوم وأنا خارج المنزل فاني أقوم بأخدها معي. | | | | | |
| 8 | أقوم بتدويرrecycle النفايات الورقية و الزجاجية والمعدنية في المنزل أوالجامعة . | | | | | |
| 9 | أتجنب شراء المنتجات التي تضر بالبيئة. | | | | | |
| 10 | أتكلم مع عائلتي وأصدقائي عن ما يمكن أن يفعلوه لحل المشكلات البيئية. | | | | | |
| 11 | اكتب للسياسيين أو اتصل بهم معبرا لهم عن رأيي بالقضايا البيئية. | | | | | |
| 12 | أقوم بعمل الملاحظات حول المواضيع البيئية عند قراءتي للصحف والمجلات. | | | | | |
| 13 | أفضل شراء منتج على آخر لأنه موضب في حاوية يمكن تدويرهاrecycle أو إعادة استخدامهاreuse أو إرجاعها. | | | | | |
| 14 | أبعث برسائل إلى الصحف عن القضايا والمشكلات البيئية. | | | | | |
| 15 | اقوم بتبليغ السلطات المختصة عن المشكلات والخروقات البيئية. | | | | | |

# Translation

Dear students,

The questionnaire you are about to participate in composed of actions related to the environment and its problems. There are no correct or wrong answers and it is correct as long it describes your feeling about the environment. Please put (√) in front of the statements and in the cell (almost always, often, sometimes, almost never, never) which corresponds closely to your opinion.

| No. | Statement | Almost always | often | Sometimes | Almost never | Never |
|---|---|---|---|---|---|---|
| 1. | I turn off lights and appliances when they are not being used to conserve electricity. | | | | | |
| 2. | I talk to people that I notice doing something that harms the environment in an effort to persuade that person to stop the activity. | | | | | |
| 3. | I walk, take public transportation, or ride a bike instead of using a car in order to help protect the environment | | | | | |
| 4. | I make an effort to reduce the amount of goods I consume. | | | | | |
| 5. | I set a positive environmental example for my friends to follow. | | | | | |
| 6. | I support candidates for political offices who are concerned about environmental problems and issues. | | | | | |
| 7. | If I see an aluminum can on the ground when I'm out walking, I pick it up and take it with me | | | | | |
| 8. | I recycle paper, glass and/or metal waste products at home or at university. | | | | | |
| 9. | I avoid purchasing products that have a negative impact on the environment. | | | | | |
| 10 | I talk to my family and friends about what they can do to help solve environmental problems. | | | | | |
| 11 | I write or call politicians to express my views about environmental issues. | | | | | |
| 12 | I make a point of reading newspaper and magazine articles about the environment. | | | | | |
| 13 | I purchase one product over another product because it is packaged in reusable, returnable or recyclable containers or packages. | | | | | |
| 14 | I send letters to the newspaper about environmental problems or issues. | | | | | |
| 15 | I have reported environmental problems or violations that I have noticed to the proper authorities. | | | | | |

# اختبار المعرفة البيئية لطلاب وطالبات الشهادة الجامعية الأولى بجامعة البحرين

## عزيزتي الطالبة – عزيزي الطالب:

فيما يلي اختبار في المعرفة البيئية يستهدف قياس مدى تحصيلك لبعض المعارف البيئية. ويتكـــون الاختبار من (15) سؤالا. ويلي كل سؤال أربع إجابات يشار إليها بـــالأحرف (أ، ب، ج، د) ومن بينها إجابة واحدة صحيحة. عليك بقراءة كل سؤال قراءة جيدة حتى تتمكن من اختيـــار الإجابة الصحيحة، ووضع علامة( ✓ ) أمام الحرف الذي يدل عليه في ورقة الإجابة.

1- تتكون الشبكة الغذائية من:

أ – حيوانات تأكل حيوانات أخرى. ( )

ب– جميع الحيوانات آكلة الأعشاب والحيوانات آكلة اللحوم. ( )

ج– الكثير من السلاسل الغذائية المتشابكة. ( )

د – جميع المستهلكات في النظام البيئي. ( )

2-أفراد النوع الواحد الذين يعيشون على أرض غابةٍ ما يتقاسمون نفس:

أ – الكوّة البيئية Niche. ( )

ب– الموطن البيئي Habitat . ( )

ج– نمط الحياة . ( )

د – المصدر الغذائي . ( )

3- تتغذى الذئاب على الغزلان. هل يشكل هذا التفاعل أي فائدة لجماعة Population الغزلان:

أ – نعم، الذئاب تعمل على ضبط حجم جماعة الغزلان . ( )

ب– لا، جماعة الغزلان تتضرر فقط . ( )

ج– نعم، لأن الذئاب تعمل على جعل جماعة الغزلان اقوى لأن الغزلان الاسرع والأكثر يقظة هي التي تنجو . ( )

د – كل من أ و ج . ( )

4- اعتمادًا على القوانين الأساسية لعلم البيئة الطبيعية Ecology، نستنتج أن:

أ – الإنسان هو أحد أنواع الذروة الذي سيستمر إلى الأبد. ( )

ب– النوع البشري سينقرض ولايمكننا فعل اي شيء حيال ذلك . ( )

ج– النوع البشري سيستمر طالما وجد نظام بيئي متزن يدعم استمرار الانسان . ( )

د – لا يمكن التنبؤ بأي شكل من الأشكال بمصير الإنسان لان مبادىء علم البيئة الطبيعية لا تنطبق عليه. ( )

5-عملية البناء الضوئي في النباتات الخضراء:

أ – تَستخدم ضوء الشمس لحرق الطاقة في النبات. ( )

ب– تُحول الطاقة الضوئية الى طاقة كيميائية . ( )

ج– تُحول الكلوروفيل (المادة الخضراء) إلى سكر . ( )

د – العملية التي يحرق فيها النبات الطاقة المختزنه لديه حتى يستطيع النمو . ( )

6-أي من المصطلحات التالية يصف تفاعل المكونات الحية وغير الحية في منطقة معينة:

أ – الموطن البيئي. ( )

ب– المجتمع Community . ( )

ج– التنوع الحيوي . ( )

د – النظام البيئي . ( )

7- تلوث نظام بيئي مائيٌ ما بمادة كيميائية تختزن في دهون الجسم. في أي مجموعة من المجموعات التالية في النظ البيئي يحتمل أن يكون تركيز هذه المادة الكيميائية أكبر:

أ – النباتات. ( )

ب– الأسماك الصغيرة . ( )

ج– الأسماك التي تأكل النباتات والحشرات . ( )

د – الطيور التي تتغذى على الأسماك. ( )

8- مصطلح يشير إلى قدرة النظام البيئي على تحمل النمو السكاني دون الإضرار بالبيئة:

أ – قدرة التحمل البيئي Carrying capacity . ( )

ب– ثقل النوع Species loading . ( )

ج– النمو غير المستدام. ( )

د – جميع ما سبق. ( )

9- بعض مبيدات الحشرات التي كانت فعالة في السابق لم تعد لها نفس الفاعلية اليوم بسبب:

أ – تطور أنواع جديدة من الحشرات يوميا. ( )

ب– استخدام النوع الخاطئ من المبيدات الحشرية . ( )

ج– الحشرات ذات المناعة الطبيعية تنجو ثم تتكاثر . ( )

د – الحشرات تتكاثر بصورة اكبر من قدرة المبيدات الحشرية على قتلها . ( )

10 -أي من الغازات التالية يساهم في التلوث عند سطح الأرض ولكنه يعمل كدرع واق من الأشعة فوق البنفسجية طبقات الجو العليا:

أ – أكسيد النيتروجين. ( )

ب– الميثان . ( )

ج– الأوزون . ( )

د – ثاني أكسيد الكبريت . ( )

11-المصدر الرئيس للإنبعاثات المسببة للأمطار الحمضية في العالم هو:

أ – البراكين وحرائق الغابات. ( )

ب– مصانع تكرير النفط . ( )

ج– السيارات ومحطات الكهرباء التي تعمل بالفحم . ( )

د – رذاذ البخاخات وتسرب المبردات . ( )

12- معدل انقراض الأنواع (Species) في الوقت الحالي هو الاعلى منذ انقراض الديناصورات. السبب الرئيسي لهذا الانحدار السريع في التنوع الحيوي هو :

أ – تغيير الإنسان لمواطن البيئة . ( )

ب– الصيد غير القانوني او جمع الحيوانات والنباتات . ( )

ج– تغير مناخ الارض بسبب انشطة الانسان . ( )

د – صيد الإنسان للرياضة والحصول على الغذاء . ( )

13- حدثت كارثة نووية كبيرة في عام 1986 في محطة_____ للطاقة النووية:

أ – بلغراد . ( )

ب– نكاساكي . ( )

ج– شيرنوبيل. ( )

د – ثري مايل آيلند . ( )

14- أي من الخيارات التالية هي الاكثر قدرة على مساعدة الانواع المهددة بالانقراض:

أ – حضر بيع او حيازة الأنواع المهددة بالانقراض أو أي من منتجاتها مثل الجلود او الفراء او العاج...الخ( )

ب– خلق برنامج تزاوج للحيوانات المهددة بالانقراض في حدائق الحيوانات. ( )

ج– استخدام طرق زراعة لاتضر بالبيئة . ( )

د – تخصيص مناطق طبيعية كبيرة لهم . ( )

15-أي من الخيارات التالية يعد <u>الأفضل</u> للتقليل من مشكلة النفايات الصلبة على <u>المدى البعيد</u>:

أ – حرقها . ( )

ب– تقليل المواد المستهلكة . ( )

ج– إعادة استخدام المواد لاغراض اخرى . ( )

د – إعادة تدوير المواد التي يمكن استخدامها مجددا . ( )

نهاية الاستبيان

شكرا على المشاركة

# Translation

1. A food web consists of
   a) The animals that eat other animals in a community.
   b) All the herbivores and carnivores in an ecosystem.
   c) Many interconnected food chains.
   d) All the consumers in an ecosystem.
2. All of the same individual organisms that live on the ground in a particular forest Share the same
   a) Niche.
   b) Habitat.
   c) Life-style.
   d) Food source.
3. Wolves eat deer. Does this interaction have any beneficial effects on the deer population as a whole?
   a) Yes, the wolves help keep the deer population size controlled.
   b) No. The deer population is only harmed.
   c) Yes, the wolves help keep the population strong since the fastest, Most alert deer survive.
   c) Both (a) and (c).
4. Based upon major ecological principles, we should conclude that
   a) humans are a climax species that will last indefinitely.
   b) the human species will soon become extinct; nothing we can do will prevent this.
   c) the human species will last as long as there is a balanced ecosystem that will support human life.
   d) there is no way of predicting what will happen to the human species; ecological principles do not apply to humans.
5. The process of photosynthesis in green plants
   a) uses sunlight to burn energy in plants.
   b) changes light energy into chemical energy.
   c) changes chlorophyll into sugar.
   d) is a process used to burn sugar stored in plants so the plants can grow.
6. Which of the following terms is used to describe all of the natural living and nonliving interacting features of a given area?
   a) habitat
   b) Community
   c) Biodiversity
   d) Ecosystem
7. A particular aquatic ecosystem is contaminated by a chemical which tends to remain stored in body fat. The highest concentration of this chemical would most likely be found in which group of organisms in the ecosystem?
   a) Plant life
   b) Minnows
   c) Fish that eat insects and plants
   c) fish-eating birds
8. Which of the following phrases refers to the potential ability of a system to support population growth without harming the environment?
   a) Carrying capacity
   b) Species loading
   c) Non-sustainable growth
   d) all of the above

9. Some insecticides that were once effective in killing insects no longer work very well. This is because
    a) New insect species develop every day.
    b) The wrong kind of insecticides were used.
    c) Insects with natural resistance survived and multiplied.
    d) The insects produced many more offspring than the insecticide could kill.
10. Which of the following contributes to air pollution at the surface of the earth, and acts as a shield against ultraviolet rays in upper atmosphere?
    a) Nitrous oxide
    b) Methane
    c) Ozone
    d) Sulfur dioxide
11. The main source(s) of emissions that have been identified as contributing to acid deposition (acid rain) in the United States are
    a) Volcanoes and forest fires
    b) Petroleum refineries
    c) Automobiles and coal burning power plants
    d) Aerosol sprays and refrigerant leakage
12. The rate of species' extinction is higher now than at any time since the period of the dinosaurs' extinction. The main cause of this rapid decline in biodiversity is
    a) habitat alteration by humans
    b) the illegal poaching or collecting of animals and plants.
    c) changes in the Earth's atmosphere due to human activities.
    d) hunting by humans for food or sport.
13. a major nuclear accident occurred in 1986 at the _____ nuclear power plant.
    a) Belgrade
    b) Nagasaki
    c) Chernobyl
    d) Three Mile Island
14. Which of the following is most likely to help endangered species?
    a) Outlaw the sale or possession of endangered species or products made from them (skins, furs, ivory, etc.)
    b) Create breeding programs in zoos for endangered animals.
    c) Use farming methods which do not damage habitat.
    d) Maintain large protected natural areas where they live.
15. In the long term, which of the following would be the **best** way to lessen the problem of solid waste?
    a) Incinerate waste materials
    b) Reduce the amount of materials being consumed.
    c) Reuse materials for other purposes rather than throwing them out.
    d) Recycle materials that can be used again.

This is the end of the survey.
Thank you for your participation!

# ورقة الإجابة على الاستبانة المرفقة

السلام عليكم

اسمي عبدالحميد السيد جواد الوداعي طالب دراسات عليا قسم البيئة والتنمية المستدامة. حاليا اقوم بكتابة رسالتي حول مستوى الثقافة البيئية لدى طلاب جامعة البحرين. ارجو مساعدتي في ملأ الاستبانة الموجودة لديكم باستخدام ورقة الاجابة هذه. علما بان هذه الاستبانة لاتشكل اي جزء من دراستكم وتاكدوا بان جميع البيانات ستبقى سرية.

الاسم ( اختياري ): ..... الجنس : ☐ ذكر ☐ أنثى الكلية:.....

السن :☐ < 20 ☐> 20 السنة الدراسية :☐ اولى ☐ ثانية ☐ ثالثة ☐ رابعة

**الاتجاهات البيئية:**

| العبارة | اوافق تماما | اوافق | غير متاكد | غير موافق | غير موافق تماما |
|---|---|---|---|---|---|
| العبارة رقم 1 | | | | | |
| العبارة رقم 2 | | | | | |
| العبارة رقم 3 | | | | | |
| العبارة رقم 4 | | | | | |
| العبارة رقم 5 | | | | | |
| العبارة رقم 6 | | | | | |
| العبارة رقم 7 | | | | | |
| العبارة رقم 8 | | | | | |
| العبارة رقم 9 | | | | | |
| العبارة رقم 10 | | | | | |
| العبارة رقم 11 | | | | | |
| العبارة رقم 12 | | | | | |
| العبارة رقم 13 | | | | | |
| العبارة رقم 14 | | | | | |
| العبارة رقم 15 | | | | | |

**السلوكيات البيئية:**

| العبارة | دائما | احيانا | غير متاكد | لافعله | لافعله مطلقا |
|---|---|---|---|---|---|
| العبارة رقم 1 | | | | | |
| العبارة رقم 2 | | | | | |
| العبارة رقم 3 | | | | | |
| العبارة رقم 4 | | | | | |
| العبارة رقم 5 | | | | | |
| العبارة رقم 6 | | | | | |
| العبارة رقم 7 | | | | | |
| العبارة رقم 8 | | | | | |
| العبارة رقم 9 | | | | | |
| العبارة رقم 10 | | | | | |
| العبارة رقم 11 | | | | | |
| العبارة رقم 12 | | | | | |
| العبارة رقم 13 | | | | | |
| العبارة رقم 14 | | | | | |
| العبارة رقم 15 | | | | | |

**المعرفة البيئية:**

| السؤال | أ | ب | ج | د |
|---|---|---|---|---|
| السؤال رقم 1 | | | | |
| السؤال رقم 2 | | | | |
| السؤال رقم 3 | | | | |
| السؤال رقم 4 | | | | |
| السؤال رقم 5 | | | | |
| السؤال رقم 6 | | | | |
| السؤال رقم 7 | | | | |
| السؤال رقم 8 | | | | |
| السؤال رقم 9 | | | | |
| السؤال رقم 10 | | | | |

**Answer sheet**

**Hello, my name is Hameed s.Jawad Alwedaei . I am a student in environment and sustainable development a master program administered by the deanship of scientific research. Currently I am writing my thesis about the level of environmental literacy at the University of Bahrain. Please help me with answering the questions and statements submitted to you by using this answer sheet. Rest assured that this process has nothing to do with your grades and all information would be treated as confidential.**

Name(optional):..... Sex: ☐ male ☐ female College: .....
Age: ☐ < 20 ☐ > 20 Class standing: ☐ first ☐second ☐third ☐forth

**Environmental attitudes**

| Statement | Strongly agree | agree | No opinion | disagree | Strongly disagree |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

**Environmental behavior**

| Statement | Almost always | often | Sometimes | Almost never | never |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |
| 14 | | | | | |
| 15 | | | | | |

| Question | a | b | c | d |
|---|---|---|---|---|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |

# Appendix - - C the Wisconsin environmental education framework

**Framework**
**Wisconsin Center for Environmental Education (1992)**
**University of Wisconsin, Steven's Point**

## Cognitive Outcomes:

### Knowledge of Ecological Principles

**Individuals, Populations, and Communities**—habitats, niches, and adaptations; food chains, food webs; population dynamics; population and community interactions

**Change and Limiting Factors**—change as a natural process; biotic and abiotic limits to growth, size, and distribution of populations

**Energy Flow**—sun as primary source, other sources and forms of energy; transfer and energy through living systems; first and second laws of energy—conservation of energy, entropy; need for a consistent source of energy by systems and individuals; photosynthesis and respiration

**Biogeochemical Cycling**—conservation of matter, nutrient and materials cycling; hydrologic cycle

**Ecosystems and Biodiversity**—importance of biodiversity; interdependence of organisms; ecosystems

### Knowledge of Environmental Problems and Issues

**Air Quality**—ozone depletion; global warming; acid deposition; air pollution

**Water Quality and Quantity**—water pollution; use and management

**Soil Quality and Quantity**—soil depletion and pollution; use and management

**Wildlife and Habitat**—habitat and biodiversity loss; use and management

**Energy**—sustainable and non-renewable; consumption

**Human Population and Health**—overpopulation: environmental health hazards

**Waste**—solid waste; hazardous wastes

### Knowledge of Environmental Issue Investigation and Action Strategies

### Knowledge of Strategies Used to Investigate

**Environmental Problems and Issues**

**Knowledge of Appropriate Action Strategies for the Prevention or Resolution of Environmental Problems and Issues**

**Affective Outcomes:**

Environmental Sensitivity/Awareness

Positive Attitudes and Values for the Prevention and Remediation of Environmental Problems and Issues Regarding: air quality; water quality and quantity; soil quality and quantity; wildlife and habitat; energy; human population and health; waste

**Determinants of Environmentally Responsible Behavior**

Locus of Control

Assumption of Personal Responsibility

**Environmentally Responsible Behaviors**

Ecomanagement; Economic Action; Persuasion; Political Action; Legal Action

**Appendix - - D Table showing the universities in Bahrain and their number of colleges, undergraduate programs and number of students (general directorate of statestics, 2004)**

| The university | Colleges with undergraduate programs | Number of undergraduate programs | Number of students |
|---|---|---|---|
| the Arabian Gulf University | 1 | 1 | 803 |
| Ahlia University | 4 | 11 | 199 |
| AMA | 1 | 5 | 889 |
| Arab open university | 3 | 3 | 995 |
| Applied science university | 3 | 11 | Not available |
| University college of Bahrain | 2 | 9 | 274 |
| The gulf university | 5 | 22 | 272 |
| The kingdom university | 3 | 12 | Not available |
| New York Institute of Technology | 1 | 5 | Not available |
| The Medical University of Bahrain | 1 | 2 | Not available |
| The Royal University for Women | 4 | 4 | Not available |

**Appendix- - E Table showing the colleges at the University of Bahrain, the undergraduate programs, environmental specialization, environmentally compulsory course and elective courses(source :university of Bahrain website:www.uob.edu.bh)**

| College | Academic departments | Academic program | Environmental specialization | compulsory course with environmental content | elective course with environmental content |
|---|---|---|---|---|---|
| Arts | Arabic and Islamic studies | BA in Arabic studies | N | N | Y |
| | | BA in Islamic studies | N | N | Y |
| | Social sciences | BA in sociology | Y | Y | Y |
| | | BA in social service | N | N | Y |
| | | BA in Geography | Y | Y | Y |
| | | BA in history | N | N | Y |
| | English language and its arts | BA in English language and its arts | N | N | Y |
| | Information, tourism and arts | BA in information | N | N | Y |
| | | BA in tourism | N | N | Y |

| College | Academic departments | Academic program | Environmental specialization | compulsory course with environmental content | elective course with environmental content |
|---|---|---|---|---|---|
| business | Management & Marketing | B.Sc. in Business Management | N | N | Y |
| | | B.Sc. in Marketing | N | N | Y |
| | Accounting | B.Sc in Accounting | N | N | Y |
| | Economics and Finance | B.Sc. in Banking and Finance | N | N | Y |
| law | Public Law | Academic program BA of law | N | N | Y |
| | Private Law | | | | |

| College | Academic departments | Academic program | Environmental specialization | compulsory course with environmental content | elective course with environmental content |
|---|---|---|---|---|---|
| Education | curricula and teaching methods | B.ed ( English) | N | N | Y |
| | | B.ed (primary education) | N | Y | Y |
| | | B.ed arts | N | N | Y |
| | Education Technology | B.ed of educational technology | N | N | Y |
| | Psychology | B.ed of educational Psychology | N | N | Y |
| | Physical education | B.ed of Physical education | N | N | Y |

| College | Academic departments | Academic program | Environmental specialization | compulsory course with environmental content | elective course with environmental content |
|---|---|---|---|---|---|
| Engineering | Department of Civil and Architectural Engineering | Bachelor of Science in Architectural Engineering | N | N | Y |
| | | Bachelor of Science in Civil Engineering | N | Y | Y |
| | Chemical Engineering | Bachelor of Science in Chemical Engineering | N | N | Y |
| | Department of Electrical and Electronics Engineering | Bachelor of Science in Electrical Engineering | N | N | Y |
| | Department of Mechanical Engineering | Bachelor of Science in Mechanical Engineering | N | N | Y |

| College | Academic departments | Academic program | Environmental specialization | compulsory course with environmental content | elective course with environmental content |
|---|---|---|---|---|---|
| Information technology | Computer Engineering | BSc in Computer Engineering | N | N | Y |
| | computer science | BSc in Computer Engineering | N | N | Y |
| | | Business information systems | N | N | Y |

| College | Academic departments | Academic program | Environmental Majors | compulsory course with environmental content | elective course with environmental content |
|---|---|---|---|---|---|
| science | Physics | Bsc Physics | N | N | Y |
| | Chemistry | BSc. Chemistry | N | N | Y |
| | Mathematics | Bsc in math | N | N | Y |
| | Biology | Bsc in biology | N | Y | Y |

## Appendix - - F
## Excerpt for the recurrent expenditure of ministries for the fiscal year 2005 and 2006

### Table( ٣ ) جدول

المصروفات المتكررة حسب الوزارات والجهات الحكومية للسنتين الماليتين ٢٠٠٥ و ٢٠٠٦

### Recurrent Expenditure by Ministries for the Fiscal years 2005 & 2006

| | BD دينار | | | |
|---|---|---|---|---|
| Description | 2006 Budget | 2005 Budget | | Code |
| Public Commission For the Protection of Marine Resources, Environment & Wildlife | 3,281,000 | 3,028,000 | الهيئة العامة لحماية الثروة البحرية والبيئة والحياة الفطرية | 41 |
| Mohd Bin Khalifa Al Khalifa Cardiac Center | 5,591,000 | 5,591,000 | مركز محمد بن خليفة آل خليفة التخصصي للقلب | 43 |
| Ministry of State for Shura Council & Representatives Council Affairs | 585,000 | 552,500 | وزارة الدولة لشئون مجلسي الشورى والنواب | 54 |
| Tenders Board | 637,000 | 630,000 | مجلس المناقصات | 59 |
| **Transfer Budget** | **249,606,600** | **240,072,900** | **الميزانيات التحويليـــة** | |
| Municipality Councils | 612,000 | 612,000 | المجالس البلدية | 60 14 |
| Constitutional Court | 1,620,000 | 1,620,000 | المحكمة الدستورية | 60 15 |
| Radio & TV Corporation | 11,000,000 | 11,000,000 | هيئة الاذاعة والتلفزيون | 60 20 |
| Bahrain Center for Research & Study | 1,131,000 | 1,131,000 | مركز البحرين للدراسات والبحوث | 60 24 |
| Sunni Awqaf | 465,000 | 465,000 | الأوقاف السنية | 60 27 |
| Ja'afari Awqaf | 465,000 | 465,000 | الأوقاف الجعفرية | 60 28 |
| Bahrain University | 32,000,000 | 32,000,000 | جامعة البحرين | 60 30 |
| Subsidies | 10,936,000 | 9,936,000 | إعانة الغلاء | 60 34 |
| Bait al-Qura'an | 76,000 | 76,000 | بيت القرآن | 60 35 |
| Shura Council | 3,967,200 | 3,913,200 | مجلس الشورى | 60 37 |
| Districts | 3,352,000 | 3,352,000 | المحافظات | 60 39 |
| High Council for Islamic Affairs | 1,440,000 | 1,440,000 | المجلس الأعلى للشئون الاسلامية | 60 41 |
| National Audit Court | 2,203,000 | 2,203,000 | ديوان الرقابة المالية | 60 42 |
| High Council for Vocational Training | 3,500,000 | 3,500,000 | المجلس الأعلى للتدريب المهني | 60 46 |
| Office of the Economic Representative, Washington DC | 200,000 | 200,000 | مكتب التمثيل الاقتصادي للمملكة بواشنطن | 60 63 |

## ملخص

### مستوى الثقافة البيئية لطلاب الشهادة الاولى في جامعة البحرين

هدفت هذه الدراسة لقياس مستوى الثقافة البيئية لطلاب الشهادة الاولى في جامعة البحرين. ولتحقيق هذا الهدف تم اشتقاق استبانة من اطار ويسكونسن للتربية البيئية حيث تكونت الاستبانة من ثلاثة اقسام رئيسية تقيس المحاور الثلاث للثقافة البيئية وهي الاتجاهات والسلوكيات والمعرفة البيئية. كما تم اضافة قسم رابع سمي بمستوى الثقافة البيئية العام يتكون باضافة درجات الاقسام الثلاث واستخدم ككاشف للاتجاه العام للثقافة البيئية.

ولتحقيق صدق الاستبانة تم ارسالها الى عدد من المختصين والمهتمين بالبيئة وعلومها حيث تم الاخذ بتوصياتهم كلما امكن ذلك.

وحتى يتحقق ثبات الاستبانة قام الباحث بتطبيقها على عينة مشابهة للمجتمع المراد دراسته والتي تكونت من ثماني وثلاثين طالبا وطالبة من جامعة البحرين. وقد تم حساب معامل الثبات الداخلي باستخدام معامل كرونباخ وجاءت النتائج كالتالي:

- استبانة الاتجاهات البيئية 0.84
- استبانة السلوكيات البيئية 0.81
- امتحان المعرفة البيئية 0.73

وتعتبر هذه الدرجات صادقة بحسب معايير العلوم الانسانية.

بعد ذلك تمت دراسة مجتمع البحث و تحديد العدد المناسب للبحث من خلال تطبيق معادلة سميث وطبقت الاستبانات على عينة عشوائية ممثلة من مجتمع البحث بلغ حجمها 402 طالب وطالبة.

بعد ذلك فرغت الاستبانات وتم معالجتها احصائيا بواسطة برنامج SPSS الاصدار 12.01 وجاءت النتائج كالتالي:

- مستوى الاتجاهات البئية: 34.93 (58.22%)
- مستوى السلوكيات البئية: 26.36 (43.94%)
- مستوى المعرفة البئية: 20.31 (33.85%)
- المستوى العام للثقافة البيئية: 79.09 (39.76%)

كما تم حساب معامل الارتباط بين المتغيرات الرئيسية للثقافة البيئية حيث جاءت النتائج على النحو التالي

- معامل الارتباط بين الاتجاهات والمعرفة البيئية: 0. 421
- معامل الارتباط بين الاتجاهات والسلوكيات البيئية: 0. 312
- معامل الارتباط بين السلوكيات والمعرفة البيئية: 0.021

كما تم تحليل النتائج حسب متغيرات الجنس والسن والسنة الدراسية وجاءت النتائج كالتالي:

اولا: على متغير الجنس

- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس الاتجاهات البيئية حسب متغير الجنس.

- وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس السلوكيات البيئية بين البنين والبنات لصالح البنين.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس المعرفة البيئية حسب متغير الجنس.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس المستوى العام للثقافة البيئية حسب متغير الجنس.

ثانيا على متغير السن:

- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس الاتجاهات البيئية حسب متغير السن.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس السلوكيات البيئية حسب متغير السن.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس المعرفة البيئية حسب متغير السن.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس المستوى العام للثقافة البيئية حسب متغير السن.

ثالثا: متغير السنة الدراسية:

- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس الاتجاهات البيئية حسب متغير السنة الدراسية.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس السلوكيات البيئية حسب متغير السنة الدراسية.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس المعرفة البيئية حسب متغير السنة الدراسية.
- عدم وجود فروق ذات دلالات احصائية في مستوى الاداء على مقياس المستوى العام للثقافة البيئية حسب متغير السنة الدراسية .
- وقد انتهى البحث بمجموعة من التوصيات والمقترحات للدراسات المستقبلية.