Research Article

Relationship between the concepts of renewable energies and environmental awareness of physics students

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Abstract: The research aims to verify the level of acquisition by students of the physics department of the concepts of renewable energies and their level of environmental awareness, as well as to verify the type and degree of correlation between the students of the physics department's acquisition of concepts of renewable energies and their environmental awareness, the researcher used the descriptive research method for its relevance to the nature of the research, and the formation of the research community of all the students of the physics departments in the faculties of education in the Iraqi universities in Baghdad governorate (Baghdad, Al-Mustansiriya and Al-Iraqia), the fourth stage of the morning study is (383) male and female, (152) male and female students from the University of Baghdad - College of Education for Pure Sciences Ibn Al-Haytham and from Al-Mustansiriya University (170) male and female students, and from the Iraqi University (61) male and female students, the research sample consisted of 304 male and female students from the research community, and the research tools consisted of testing the acquisition of the concepts of renewable energies that consisted of (54) item measuring elements of the concept at the level of definition, example and application, and the measure of environmental awareness that consisted of 65 item, the results showed that the students of the three physics departments acquired the concepts of renewable energies at the intermediate level, and that the students of the physics department at the University of Baghdad, Faculty of Education for Pure Sciences, Ibn al-Haytham, had a good environmental awareness, the students of the physics departments in the College of Education Al-Mustansiriya University and the Iraqi University have medium environmental awareness, and the results showed that there is a significant correlation between the acquisition of concepts of renewable energies and environmental awareness among the students of the research sample, and in light of the results, the researcher made a number of recommendations, including the need to pay attention to including education Environmental and renewable energies concepts in the curricula of the faculties of education, especially the Department of Physics, they also suggested conducting other studies similar to this study to complement the research.

Key Word: The Concepts Of Renewable Energies , Environmental Awareness

Introduction: Renewable energies are among the concepts that have recently emerged in the field of science and scientific education, it is a type of inexhaustible energies and its name indicates that whenever it is nearing its end, it is formed again, and these energies are characterized by being very economical and considered an important factor in environmental development because their sources are purely natural, such as wind, sun, and water thus, they are clean and environmentally friendly non-traditional energies that do not negatively affect the surrounding environment, unlike the fossil energies resulting from materials extracted from the earth's interior, which are primarily concerned with (oil, coal and gas), as these sources lead to global warming, and the release of harmful gases such as carbon dioxide that harm the environment when used, in addition to being threatened with run out, so it has become necessary to raise awareness in general about the importance of searching for alternative and clean energies that meet the needs of society and at the same time preserve the environment from pollution, where the Economic and Social Commission for Western Asian States (ESCWA, 2002) stressed at the World Summit on

Sustainable Development the importance of spreading public awareness by introducing topics of renewable energies with all its concepts and types in education programs for different academic levels, especially the university stage, as well as implementing many training programs (ESCWA). , 2002: 17).

Research problem: Despite the growing interest in environmental awareness and environmental education at the local and global levels, environmental problems were and are still increasing due to weak environmental awareness among humans, resulting from the over-exploitation of environmental resources, and they mention (Khanfar and Khanfar, 2016) that preserving The environment requires educating all components of society about the benefits and risks of the environment, the attempts made by developed countries to preserve the environment are carried out by the human being himself and his culture, as he is the actual controller in most environmental matters, as many studies have indicated that it is not possible to leave the matter of environmental education to chance or randomness, but rather it must have an appropriate and distinct position in the programs Education, Policies and Plans (Khanfar and Khanfar, 2016: 146).

Here, the role of educational institutions in spreading environmental awareness among students emerges, and through the researcher's modest experience in studying and teaching physics, as well as observing the practices of students in the physics department, after consulting with experts, it was found that there may be a weakness in their acquisition of the concepts of renewable energies and their environmental awareness, so this research came as an attempt to reveal the relationship between the concepts of renewable energies and environmental awareness among students of the physics department, so the research problem was formulated with the following question:

What is the level of physics department students' acquisition of the concepts of renewable energies, and what is its relationship to their environmental awareness?

Research Aim: The current research aims to verify the following:

1- The level of students' acquisition of the concepts of renewable energies in physics department.

2- The level of environmental awareness among students of the Department of Physics.

3- The type and degree of correlation between physics department students' acquisition of the concepts of renewable energies and their environmental awareness.

In order to verify the objectives of the research, the following questions were formulated:

1- What is the degree to which students of the physics department acquire the concepts of renewable energies?

2- What is the degree of environmental awareness among the students of the physics department?

3- Is there a correlation between the acquisition of the concepts of renewable energies by students of the physics department and their environmental awareness?

Research Importance: The importance of the research lies in the following:

1. Highlighting the role of physics in spreading awareness of renewable energies.
2. To provide university students in general and students of the College of Education in particular in Iraq with the concepts of renewable energies.
3. Developing environmental awareness among university students in general and students of the College of Education in particular in Iraq.
4. Research results that may provide cultural indicators for the importance of introducing curricula related to the concepts of renewable energies and environmental culture in the relevant colleges or departments.

Research limits: The current research will be limited to students of physics departments in the faculties of education in Iraqi universities in Baghdad governorate for the academic year 2020-2021.

Define terms:

Renewable energy

And he defined it (Menigel, 2019): it is the energy that comes from continuous natural sources that are renewed at a faster rate than their consumption, unlike non-renewable energies, and they are environmentally friendly and non-polluting energies (Menigel, 2019: 94).

The concept of renewable energies

The researcher did not succeed in obtaining a definition of the concept of renewable energies and defined it procedurally as:

Every term or word that refers to sustainable non-conventional energies derived from inexhaustible natural resources, which includes (solar energy, wind energy, biomass energy, hydro energy, geothermal energy, hydrogen energy) and which should be acquired by students of physics departments in faculties Education in Iraqi universities in the province of Baghdad, and this acquisition is measured by the degree that students obtain in the test prepared by the researcher.

Environmental Awareness

And he defined it (Al-Amayrah, 2019): It is the level of concepts, attitudes and skills of individuals towards environmental issues and work to achieve the requirements of the environment in order to achieve sustainable development (Amayreh, 2019: 17).

The researcher defines it procedurally: it is the understanding and awareness of the elements of the surrounding environment and the resulting practices of the students of the physics departments in the colleges of education in the Iraqi universities in the province of Baghdad, which is measured by the total score obtained by the student on the measuring instrument prepared for this study.

Theoretical background: The theoretical background content of this research includes three main terms that the researcher will present all its joints successively, namely: -

First - The concept: Education and its institutions strive to build correct and solid concepts, emphasize their characteristics and difficulties in learning and developing them for the learner, and work on how to form meanings for these concepts to be able to perceive and understand them, the concept is a mental process that takes place within the individual, which results in a mental image or a general idea of a specific object, situation or subject.

Components of the concept: (Salman and Nabhan, 2006) indicated that the concept consists of several elements, namely:

1- The name of the concept, symbol or scientific term.
2- Defining the concept, i.e. its verbal significance.
3- The basic characteristics or qualities that distinguish the concept from other concepts.
4- Examples belonging and not belonging to the concept (Salman and Nabhan, 2006: 21).

Stages of concept formation: During the process of acquiring and forming concepts for the learner, the concept passes through several stages, where (Bogos, 2002) indicates that building concepts takes place in the following stages:

1- Direct interaction with situations or things.
2- Forming a mental image by imagining these situations or things.
3- Using language or symbols to connect and deal with objects and symbols.
4- The growth of concepts occurs from ambiguity to clarity, that is, from an ambiguous concept to a clear concept.
5- Moving from an inaccurate concept to an accurate concept (scientifically).
6- From the concrete concept to the abstract concept. (Baoqas, 2002: 35)

Second - Renewable energies: The interest in this type of energy sources goes back to the beginning of the seventies and mainly to the year of the energy crisis in 1973 and the repercussions of this crisis on the economies of the developed countries, which concluded that the solution available to get rid of their economy's dependence on oil is to work on developing alternative local sources, but this interest soon faded after the drop in oil prices in the world market (Boras and Al-Ashi, 2018: 556), but with the growing intellectual and environmental awareness, the world began to strive hard to search for alternative energies to the traditional energies represented by fossil energy and the environmental problems it causes, in light of the scientific and technological developments that the twenty-first century is witnessing, it has become necessary to enlighten university students, especially students of physics departments, about the concepts of renewable energies and to seek to use modern teaching methods appropriate to learning this concept, acquiring it, and being familiar with it. Among the types of renewable energies are the following:

Solar energy: The energy of the sun is enormous by all standards and its abundance is uninterrupted, as it is continuous energy, and despite the small size of the energy that reaches the earth, which is caused by the small size of the earth's surface compared to the sun, the amount of energy that reaches is 5000 more than the size of the global total need for energy once, to the extent that what reaches the earth from solar radiation within 105 minutes is enough to meet the needs of the world's consumption for a whole year (Shawq and Saraa, 2014: 5), and some researchers believe that it is possible to convert solar energy into other forms of energies, as it is mentioned (Abdel-Fattah, 2019). It is possible to convert solar energy into other energies, such as:

- Converting from solar energy to thermal energy, which is one of the simplest processes in converting solar energy.
- Converting solar energy into electrical energy by photovoltaic cells.
- Converting solar energy into chemical energy, as is the case in the photosynthesis process of plants, and this conversion is used to generate electricity and some gases as well as to produce fuel (Abdel-Fattah, 2019: 22).

2-Wind energy or air energy: It is energy that is derived from wind and air movement, as this type of energy has been exploited since ancient times in the management of windmills to grind grain and raise water wells, as well as in the management of sailing ships, and wind energy is exploited by using wind units to convert it into Mechanical energy that is used directly or converted into electrical energy through its own generators (Marzouk, 2018: 16-17)

3- Water energy: It is defined as the energy derived from the continuous movement of water that cannot be exhausted, or it is the investment of water movement for useful purposes, and it is considered one of the most important sources of renewable energies, as the use of water energy was limited before the spread of commercial electric energy to grinding grain and industry Weaving and irrigation (Boras and Al-Ashi, 2018: 588), but after the electricity era entered, water was used to generate electric power and in light of this, power plants were established on river beds, dams and artificial lakes were also built in order to provide abundant amounts of water to ensure the continuous operation of these stations (Ahmad, 2013: 54).

4-Biomass energy - biofuels: the concept of bioenergy refers to energy, electricity or heat that can be obtained through various processes on various biomass sources that store carbon, which is emitted once it is decomposed into carbon dioxide gas, and this can be obtained Type of energy in the following ways: -

A - Traditional methods: - By burning agricultural, forestry and wood residues in order to produce the thermal energy needed for heating, heating and cooking in remote and rural areas.

B- Modern methods: - These methods include investing or treating organic waste with the aim of producing solid fuels (charcoal, wood briquettes), biogas, liquid biofuels (biodiesel, ethanol) or natural fertilizers, Bioenergy technologies have a growing role in three main aspects, which have been arranged according to their importance as follows:

Heating (heating in industry and buildings), electricity production, transportation.

(Economic and Social Commission for Western Asia, 2019: 9,11).

5-Geothermal energy: The principle of geothermal heat is to extract what is available from the energy in the soil and use it in the form of electricity or heating, as the heat rises with increasing depth in the ground, and this heat is produced through the natural radioactivity of the rocks that make up the earth's crust, this heat cannot be obtained unless there are distances and permeability of the geological components of the earth's interior and it must contain layers of water storage (either underground layers that contain water or water vapor), but the actual application of exploiting this type of energies is very small due to the difficulty and difficulty of drilling and access to areas the interior of the earth and its deep depths (Dashana, 2017: 40).

6-Hydrogen energy: Hydrogen gas represents an important type of fuel, as it has all the ingredients that make it a successful fuel, therefore, it is a candidate to play a major role in securing future energy, as it is the cleanest and lightest gas and can be converted with unparalleled efficiency into other forms of energy (Jahmum, 2012: 32), and the researcher believes that hydrogen is a new member of the renewable energy family, as it is a fuel the future and the most promising element in the production of clean renewable energy, its use as an alternative fuel to fossil fuels contributes to preserving the environment and ridding it of all forms of pollution.

Third - Environmental awareness: The concept of awareness arose to refer to knowledge and awareness, but with the passage of time it has become today a standard for measuring social development at its various levels, it is a concept whose meaning is comprehensive and at the same time subject to division within the framework of different

disciplines, where it is known as the adjective that is attached to it, and thus the concept of awareness has become a topic that attracts many scientific disciplines such as psychological sciences, sociology, psychology, law and other different disciplines, and environmental awareness is one of its branches that Preoccupy researchers' attention regardless of how they approach it. Environmental awareness is a successful method and method for protecting and caring for the environment (Borzek, 2009: 60),the researcher describes environmental awareness as what the individual acquires from the understanding and awareness of the environmental elements around him and the behavioral practices he must take towards them that contribute to improving the environmental reality and maintaining its sustainability, and through the researcher's review of the literature and previous studies related to environmental awareness as a study (Ben Yahya (2005) and (Al-Mawla, 2009) and (Al-Zoubi, 2015) it is clear that environmental awareness includes two main dimensions:

1- Environmental information: It means all data, ideas, news and knowledge related to the environment and its problems that the individual obtains from the media, educational institutions or other sources.

2- Attitudes towards the environment: It means those feelings, information and behavioral tendencies that the individual has towards all aspects related to the environment (Ben Yahya, 2005: 77,81).

The importance of environmental awareness: (Al-Najjar, 2019) confirms that there is a difference between the role of university education and the role of pre-university education in preserving the environment, investing it properly and solving its problems, in which the personality of the university student is in the stage of relative completeness and not in the stage of formation, where he has acquired at this stage many behavioral trends and values and has reached an appropriate stage of mental development and has formed many habits that contribute significantly to the refinement of his personality (Al-Najjar, 2019: 53).

(Agarwal, 2012) mentions that there is an urgent need to gain environmental awareness, which must permeate all ages and all segments of society, starting from childhood, and that environmental awareness must be taught in schools and colleges, and it is assumed that it is fully integrated into education (Agarwal, 2012 :49)

Previous Studies:

1- Studies dealing with the concepts of renewable energies:

- A study (Al-Samarrai, 2015): conducted in Iraq, and aimed at building an educational-learning program according to the concepts of renewable energy and nanotechnology, and knowing its impact on technological enlightenment and moral scientific awareness among third-year students in the Department of Chemistry, the results showed a statistically significant difference between the experimental group that was exposed to the educational program and the control group that was not exposed to that program in the variable of technological enlightenment and the variable of scientific moral awareness, and this difference was in favor of the experimental group.

2-Studies dealing with environmental awareness:

- A study (Hamoudi, 2016): conducted in Iraq, and aimed at identifying the effect of training biology teachers according to the training program on environmental awareness for their students, and the results showed the superiority of the students of the experimental group teachers who were trained according to the education program for sustainable development on school students The control group that was not trained according to that program in the environmental awareness variable.

Research procedures :

Determining the research community and its sample: The research community consisted of all students of the physics departments in the faculties of education in the Iraqi universities in the province of Baghdad (University of Baghdad, Al-Mustansiriya and Al-Iraqiya) the fourth stage in the morning study, and their number was (383) male and female, with (152) male and female students from the University of Baghdad - College of Education for Pure Sciences Ibn Al-Haytham, and from Al-Mustansiriya University (170) students, and from the Iraqi University (61) students, according to the statistics of the physics departments for the academic year (2020-2021) and as shown in Table (1)

Table (1) Percentages of the research population

University	gender

	male		female		total	
University of Baghdad / College of Education for Pure Sciences Ibn Al-Haytham / Department of Physics	96		56		152	
Al-Mustansiriya University/College of Education/Department of Physics	113		57		170	
Iraqi University/College of Education/Department of Physics	41		20		61	
Final total	250	65%	133	35%	383	100%

The research sample consisted of (304) male and female students from the research community (University of Baghdad, Al-Mustansiriya and Al-Iraqiya), by (134) male and female students, and divided into (104) male and female students for a sample building test for acquiring concepts of renewable energies and adapting the environmental awareness scale, and (10) students for the exploratory experiment of my tool the research and (20) male and female students for the sample of the stability of the two search tools and (170) male and female students for the applied sample, as shown in Table (2).

Table (2) Details of the research sample and percentages

S	**Sample**	**Sample**	**number**	**Percentage of the community**
1	**Building**	**The first exploratory experience of the two search tools (determining the time and clarity of the items)**	**10**	**2.61%**
		Second exploratory experiment (Statistical analysis of items)	**104**	**27.15%**
		constancy	**20**	**5.22%**
2	**Applied**		**170**	**44.38%**

3	**Excluded**	**79**	**20.62%**
	total summation	**383**	**100%**

Research tools:

First - Testing the concepts of renewable energies: After reviewing the scientific and educational literature and tests of acquiring the concepts of renewable energies, the researcher was able to identify (6) major areas of renewable energy in addition to the sub-concepts related to each concept, as follows:

• The first field: the sun and includes (6) concepts: solar energy, photovoltaic solar cells, solar thermal plants, solar still, water heater, and solar concentrators.

• The second field: wind, which includes two concepts: wind energy and wind turbine.

• The third field: water and includes (3) concepts: water energy, hydroelectric energy, and tidal energy.

• The fourth field: biomass and includes one concept: biomass energy.

The fifth field: geothermal heat and includes one concept: geothermal energy.

• The sixth field: hydrogen, and it includes (3) concepts: hydrogen energy, hydrogen fuel cells, and water electrolysis device.

The items of testing the concepts of renewable energies were formulated based on objective tests (multiple choice test) as they have high stability and measure and evaluate many abilities of students, where the test consisted of (17) items, and each item included one concept of renewable energy concepts, three elements:

1- Defining the concept: to determine the verbal significance of the concept by the student.

2- Example of the concept: the student's ability to determine the use of the concept.

3- Applied of the concept: The student demonstrates the practical application of the concept.

And because the test includes (17) concepts, and each concept consists of (3) items, the test consists of (51) test items, and instructions have been developed for the test that include the method of answering, and model answers have been developed for all test items that the researcher relied on in correcting the test, as a score was given to one for the correct answer and zero for the incorrect answer, and thus the total score for the test items was determined in the range (0-51).

The test items were presented to a group of experts specialized in physics, renewable energies, curricula and methods of teaching, psychological and educational sciences, measurement and evaluation, to verify the validity (apparent and content), the test items obtained 80% of the experts' agreement on their validity, the statistical analysis of the test items was also conducted to find the difficulty coefficient, whose value ranged between (0.32-0.80), as for the strength of discrimination, its value ranged between (0.30-0.59) and this indicates that all test items are acceptable and valid for application, as (Allam, 2013) indicates that the test is good and valid if the difficulty coefficient ranges (0.2-0.8) and the strength of discrimination is greater than (0.3) (Allam, 2013: 307).

The equation of effectiveness of alternatives was also applied, and all of the wrong alternatives were negative, meaning that all those alternatives were attractive to weak students, the alternative is considered effective if it is negative and less than (0.05), according to what Al-Nabhan mentioned (Al-Nabhan, 2004: 203), the researcher applied Keodor Richardson-20 equation to measure the stability, and its value was (0.81) and it is considered a good stability coefficient. After these procedures, the test is ready for application.

Second - Environmental Awareness Scale: One of the research requirements is to measure the level of environmental awareness for the sample, so the researcher looked at a number of previous studies for the same variable (environmental awareness), including the study (Al-Samarrai, 2011), so the researcher adopted the environmental awareness scale that he prepared, as it fits the nature of the research It targets the same segment of society, but the researcher deliberately adapted the scale according to the steps of codifying the scales because of the long period of time between the study of the Samurai and the current study of more than (10 years), so the researcher decided to apply the psychometric properties of the scale to ensure obtaining the best results, the scale consisted of (65) items between positive and negative items, and the Triple Likert scale was adopted, which includes three alternatives to answer its items, which are (agree, hesitant, do not agree), and the scores of the positive items were set at (3, 2, 1) respectively, As for the negative items, they were identified by degrees (1, 2, 3) respectively,

and instructions were prepared to help the research sample respond to the scale's items to be clear, as these instructions included the purpose of the scale, and how to answer its items, the environmental awareness scale was presented to a group of specialists in physics, curricula, teaching methods, educational and psychological sciences to verify the apparent validity of the scale, and an agreement percentage (80%) was obtained on all items in the scale. Serves as the logical validity of the tool.

After conducting the statistical analysis of the scale items to find the correlation coefficient of the degree of each item with the total score of the scale, where the Pearson correlation coefficient was calculated between the score of each item and the total score of the scale, as its values ranged (0.35-0.78), the items with sequences (29,24,10) were excluded due to their weak link with the total score of the scale, and the values of the discriminatory power were found for each item by applying the discrimination equation, and their values were (0.88-9.44), the two items with a sequence (46,35) were excluded, after which the environmental awareness scale became composed of 60 items in its final form, and the stability was calculated in two ways, the first by applying the alpha-Cronbach equation and the second method by the half-segmentation method.

Statistical means: The statistical package for the social sciences (SPSS) was used using the following equations: T-test equation for two independent samples, Keodor - Richardson equation (20), item difficulty equation, item discrimination equation, alternatives effectiveness equation, Pearson correlation coefficient to find internal consistency and stability. , the alpha-Cronbach equation.

Presentation of the results (analysis and interpretation): It includes answering the following questions:

1- What is the level of students' acquisition of the concepts of renewable energies in physics departments?

It was found that the average acquisition of the concepts of renewable energies among students of the Department of Physics, College of Education, Ibn Al-Haytham, University of Baghdad was (65.04%), and for the Department of Physics, College of Education, Al-Mustansiriya University (62.85%), or the Department of Physics, College of Education, Iraqi University, it reached (60.99%), and this indicates that The level of acquisition among students of the Department of Physics, College of Education for Pure Sciences Ibn Al-Haytham is slightly higher than that of students of the Department of Physics, College of Education, Al-Mustansiriya University, and students of the Department of Physics, College of Education, Iraqi University, and table (3) shows this.

Table (3) Averages of Acquisition of Renewable Energies Concepts in Physics Departments, Research Sample

	Testing the acquisition of renewable energy concepts				
Sections	**The overall score for the test**	**Arithmetic mean**	**Standard deviation**	**Hypothetical mean**	**Percentage**
Department of Physics, College of Education for Pure Sciences, Ibn Al-Haytham, University of Baghdad	**51**	**33.18**	**7.811**	**25.5**	**65.04%**
Department of Physics, College of Education, Al-Mustansiriya University		**32.05**	**6.148**		**62.85%**
Department of Physics, College of Education, Iraqi University		**31.11**	**6.011**		**60.99%**

2-What is the degree of environmental awareness among the students of the physics department?

The average environmental awareness among students of the Department of Physics, College of Education for Sciences, Ibn Al-Haytham, University of Bagda (71.388%), while the average environmental awareness among students of the Department of Physics, College of Education, Al-Mustansiriya University was (69.44%), and the average environmental awareness among students of the Department of Physics, College of Education, Iraqi

University (69%) This indicates that the level of environmental awareness among the students of the Physics Department, College of Education for Pure Sciences Ibn Al-Haytham is slightly higher than the students of the Physics Department, the College of Education, Al-Mustansiriya University, and the students of the Physics Department, the College of Education, Iraqi University, Table (4) illustrates this.

Table (4) averages of environmental awareness among students of physics departments

		Environmental Awareness Scale			
Sections	**The overall score for the test**	**Arithmetic mean**	**Standard deviation**	**Hypothetical mean**	**Percentage**
Department of Physics, College of Education for Pure Sciences, Ibn Al-Haytham, University of Baghdad	180	128.5	13.02	120	71.388%
Department of Physics, College of Education, Al-Mustansiriya University		125	12.94		69.44%
Department of Physics, College of Education, Iraqi University		124.2	12.31		69%

3- Is there a correlation between the acquisition of awareness by the students of the physics department of the concepts of renewable energies?

The Pearson correlation coefficient was adopted to calculate the correlation between the average degrees of the acquired concepts of renewable energies and the environmental awareness scale among the students of the three physics departments. Al-Mustansiriya University (0.485) and the Department of Physics, College of Education, Iraqi University (0.423), as well as the calculated t values for the three sections are greater than the tabular t values, which means that there is a significant correlation between the acquisition of renewable energy concepts and the environmental awareness scale among students of the three physics departments, as shown in Table (5).

Table (5) values of the correlation coefficient between the test of acquisition of renewable energies concepts and environmental awareness of the research sample

Test	**Section**	**Arithmetic mean**	**Standard deviation**	**The scale**	**Arithmetic mean**	**Standard deviation**	**The value of the correlation coefficient r**	**T value of the correlation coefficient**
Renewable energies concepts	**Department of Physics, College of Education for**	**33.18**	**7.811**	**Environmental Awareness Scale**	**128.5**	**13.02**	**0.492**	**4.66**

	Pure Sciences, Ibn Al-Haytham							
	Department of Physics, College of Education, Al-Mustansiriya University	**32.05**	**6.148**		**125**	**12.94**	**0.485**	**4.269**
	Department of Physics, College of Education, Iraqi University	**31.11**	**6.011**		**124.2**	**12.31**	**0.423**	**2.722**

Discuss the results:

• The axis of acquiring the concepts of renewable energy: the results showed in general that the percentages of acquiring the concepts of renewable energies among students of the Department of Physics, College of Education for Pure Sciences, Ibn Al-Haytham University of Baghdad amounted to (65.04%), while among students of the Department of Physics, the College of Education, Al-Mustansiriya University reached (62.85%), as for the students of the Department of Physics, College of Education, Iraqi University, it reached (60.99%), and this indicates that the level of acquisition of the students of the three physics departments was at an average degree.

• Environmental awareness axis: the results showed in general that the percentages of the amount of environmental awareness among students of the Department of Physics, College of Education for Pure Sciences Ibn Al-Haytham University of Baghdad amounted to (71.388%), while it reached (69.44%) among students of the Physics Department, College of Education, Al-Mustansiriya University, while among students of the Department of Physics, College of Education, Iraqi University has reached (69%), and this indicates that the level of environmental awareness among students of the Department of Physics, College of Education for Pure Sciences Ibn Al-Haytham was at a good degree, and the level of environmental awareness among students of the physics departments at Al-Mustansiriya and Al-Iraqia Universities was medium degree.

In light of these results, the researcher believes that despite the students' knowledge and interest in the environmental aspect and their environmental awareness, it was not to the desired degree, since the target community and its sample is the fourth and final stage of the university, who are considered teachers of the future and builders of future generations, the reason may be attributed to the school curricula's lack of topics related to environmental awareness.

The results also confirmed that there is a significant correlation between the acquisition of the concepts of renewable energies and environmental awareness for the students of the research sample and for the three physics departments, the reason may be attributed to the importance of the issue of renewable energies in protecting the environment and preserving the available energies and not consuming it with excessive use and searching for alternative renewable energies that preserve the environment. The researcher concluded that there is a positive correlation between the concepts of renewable energy and environmental awareness, that is, the higher the level of environmental awareness, the higher their level of acquisition, and this appeared through the level of the research sample and the following showed a significant correlation result.

Conclusions: According to the previous results, it was concluded:

1- The acquisition of the concepts of renewable energies by students of physics departments was at the average level.

2- There is no effect of the gender variable in acquiring the concepts of renewable energy among students of the three physics departments.

3- The students of the Department of Physics at the College of Education for Pure Sciences Ibn Al-Haytham possess a good degree of environmental awareness.

4- The students of the physics departments in the College of Education, Al-Mustansiriya University and the Iraqi University have medium environmental awareness.

5- There is a significant correlation between the acquisition of the concepts of renewable energies and environmental awareness among the students of the research sample.

Recommendations and suggestions: In light of the results, the researcher recommends the following:

- Encouraging research and development in the fields of renewable energies as the energy of the future.
- The need to pay attention to the inclusion of environmental education and the concepts of renewable energies in the curricula of faculties of education, especially the physics department.
- Implementation of intensive programs to raise the level of knowledge of students in the field of concepts of renewable energies as well as environmental issues.
- Attention to activating the role of environmental activities in the faculties of education within the group of activities that they provide to their students.
- Using the Renewable Energy Concept Acquisition Test as a tool to identify the extent to which students acquire these concepts.
- Using the Environmental Awareness Scale as a tool to identify the level of environmental awareness among students.

To complete the research, the researcher suggests the following:

- Conducting a study to identify the level of students' acquisition of renewable energy concepts and link them to other variables such as (sustainable development, physical enlightenment, scientific thinking).
- Conducting a content analysis of university physics curricula to determine the percentages of including renewable energies and environmental awareness for those curricula.

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