Ecological Awareness for Training-Teachers at Chemistry and Biology Departments and its Correlate with them Academic Achievement

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ABSTRACT

The present study aims to identify the ecological awareness of the training- teachers from the Chemistry and life Biology departments and its correlate to their academic achievements. Therefore, a sample of (248) training- teachers was randomly selected from Chemistry and Biology departments in the College of Education for their departments representation. The study has required building an ecological awareness scale, which was prepared by the researchers based on the literature in the field of standards and testing building. The items of the scale have reached (40) distributed over five areas, each of which has (8) items: air pollution, biosphere, chemical pollution, health care related to human life, and general care for the environment. The results show that the training-teachers have an ecological awareness and that this awareness is positively related to their academic achievement. Finally, the study has made a number of recommendations and suggestions.

Keywords: Ecological Awareness; Training-Teachers; Academic Achievement

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INTRODUCTION

Comprehensive development in all areas is important in achieving a high level of ecological awareness in the community. The Ministry of Education emphasizes the importance of development and ecological awareness in schools through activities and programs targeting students, teachers and parents.

Educators, ecologists and sociologists unite on the importance of ecological awareness, which starts from home to build a sound and solid social base adopted by future generations to create a generation loaded with ecological and health culture (Sadker, 1991). Ecological awareness plays an important role in the preventive and therapeutic areas through an integrated set of concepts, principles, systems and services that aim at enhancing the ecological situation in schools and thus in society, through activating the participation of students in the planning, implementation and follow-up of ecological activities and programs and improve the health and nutritional status of students and teachers. In view of the importance of the school’s contribution to the formation of a comprehensive ecological awareness, not only among students, but between the staff and the community as well. Modern philosophy in the teaching of science sees the need to build a positive attitude among learners towards science and its enormous potential to serve humanity (Stanley & Brickhouse, 2001).

1. LITERATURE REVIEW

Some studies (Saha, Chaudhury, Bhowmik, & Chatterjee, 2010) indicate that college students are aware of some elements of health culture (cervical cancer awareness), while the rest of the applied students Training-Teachers have awareness of ecological culture as a study (Mohammed, Hindawi, & Alkam, 2009) The study (S. Cohen & Horm-Wingerd, 1993) dealt with the ecological awareness of preschool children. The study was conducted on children between the ages of 3-5 years and from both sexes, distributed among the rural and urban residents. Three tasks were used with the study sample: (image recognition, image arrangement, understanding images).

The study showed that young children are able to distinguish accurately depicting ecological issues in relation to the nature of the task and the level of difficulty. The study also found the same results for boys and girls within the same lifetime compared to their perception of ecological issues. There were no differences in the location or location of the children's accommodation. These results provide us with knowledge in the development of ecological attitudes and behavior. The study (P. Cohen, West, & Aiken, 2014) sought to promote ecological awareness of children who are vulnerable to the practice of many negative behaviors, where the health problems facing children and adolescents of school age, and risky behaviors, such as the use of tobacco and narcotic drugs, while the study (Hansmann, Scholz, Francke, & Weymann, 2005). The study aimed to improve ecological awareness: the ecological and economic impacts of food consumption. The study was conducted at the Swiss Federal Institute of Technology in Zurich. And to improve ecological culture, as well as the behavior of individuals.

What has been already mentioned requires the preparation of teachers at a high level of ecological awareness as there is a close relationship between teacher preparation in this way and what is observed among their students: therefore, researchers have sought to uncover the ecological awareness of students at the Faculty of Education, Department of Chemistry and Biology.

Despite the efforts exerted by the Ministry of Education, there are some challenges facing ecological awareness in schools, the most important of which are: insufficient human resources working in ecological education in the school necessary to cover schools spread throughout Iraq, as well as the urgent need to activate the basic ecological and educational roles for school.

Since the human staff in schools are the ones that bear the great burden in spreading ecological awareness among students, especially teachers of chemistry, biology and other disciplines, it is necessary to research and search for the extent of these cadres have (ecological awareness) during the period of preparation in the faculties of education to practice the teaching profession. The "lost thing does not give it" where the burden of spreading this kind of awareness to these training-teachers.

Hence the current study to reveal the extent of students in the College of Education, students of the departments of chemistry and Biology at the University of Al-Qadisiyah, for (ecological awareness), which must be transferred to their students in the near future. We must not look at them as Biology students only. They are effective agents of change in their schools, communities and even their families.

2. RESEARCH OBJECTIVES

The present research aims to achieve the following objectives:

Identification of ecological awareness among students of the Faculty of Education from the departments of Chemistry and Biology

Predicting academic achievement in terms of ecological awareness (air pollution, biosphere, chemical pollution, health care related to human life, and general ecological care) by specialty (Chemistry and Biology).
3 RESEARCH LIMITS

Training teachers at Chemistry and Biology departments / Fourth stage in the College of Education, University of Al·Qadisiyah, for the academic year 2017/2018.

4. DEFINITION OF TERMS

4.1. Ecological Awareness

The ability to use the individual to understand the environment through his thinking and practices or habits to live in and enjoy the environment, in addition to studying (Kottak & Costa, 1993).

Researchers define Ecological Awareness procedurally as the individual's repertoire of knowledge, which consists of the outcome of competence about the environment through which the individual is prepared to be able to self-control and distance from ecologically undesirable behaviors, and that stock is measured by the total degree obtained by answering the scale of culture ecologically prepared by them.

4.2 Training teachers: Students of biology departments in colleges of education / fourth stage which represents the final stage of their academic study before graduation (Mohammed, 2017).

4.3 Academic Achievement: defines it as the acquired result for achieving or learning something skillfully and successfully (Rivkin, Hanushek, & Kain, 2005).

5 PROCEDURES

5.1. Methodology

The study followed the descriptive survey method as it studies the situation as it is without the intervention of the researcher in it (Vaismoradi, Turunen, & Bondas, 2013), to suit it for the purposes of the study.

5.2. Sample and Population of the Study

The study included the training teachers' community sections of Chemistry and Biology / College of Education, University of Al-Qadisiyah for the academic year 2017/2018, the researchers have taken all the members of the community as a sample of the research has been distributed as in table (1)

5.3. Study Method

The aim of the research is to uncover the ecological awareness of the students applying training teachers. Because there is no scale for this purpose, the researchers built a tool to measure it according to the following procedures:

Accessing to literature and studies that touched on the subject of ecological awareness.

Submitting an open question to a sample of experts and specialists in the fields of environment and health, teaching methods of science and medical faculty professors, about information that represents ecological and health awareness, which is necessary for training teachers of the faculties of education to enjoy (Walker, Tan, & Glicksman, 2011).

In light of the above, the researchers grouped and standardized the responses of the experts on the exploratory question within five areas: (air pollution, biosphere, chemical pollution, health care related to human life, and general ecological care).

*The researchers formulated items for each of these areas ranged between 20-25 items for each field. Where the total items of the scale in its initial form of 80 items.

5.4. Face Validity

Face validity means that a tool that was prepared actually measures the phenomenon to be measured (Broder, McGrath, & Cisneros, 2007). The face validity of the tool prepared by researchers was extracted by presenting it to a group of ecological experts. To extract the validity of the jury members, the researchers have put 80% or more of the agreement between the experts to keep the items or delete and modify them (Mohammed, Al-Khattat, & Al-Muhja, 2018). Nine items were removed and the test items consisted of an introduction followed by four alternatives, one of which was true and the remaining three were false: This is the degree of type (1 and 0).

5.5. Exploratory Application

5.5.1. Discriminatory ability:

In order for the scale to be good, it must have the ability to distinguish the groups of the individuals tested so that some get high scores and others have low scores, meaning that the scale has the ability to show distinct and different groups according to their answers (Reynolds, Livingston, Willson, & Willson, 2010) Thus, the researchers arranged the responses of the study samples in descending order and then sorted them into two ratios so that each percentage should be (27%). Thus, an independent sample t-test was performed for the independent samples and no significant differences were found for some items of the scale. Also, there is no the lack of discriminatory capacity, which has instigated the researchers to raise

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Table 1: Study Sample Distribution According to Gender and Specialization

<table>
<thead>
<tr>
<th>Student Gender</th>
<th>Chemistry</th>
<th>Biology</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>69</td>
<td>46</td>
<td>115</td>
</tr>
<tr>
<td>Female</td>
<td>67</td>
<td>66</td>
<td>133</td>
</tr>
<tr>
<td>Overall</td>
<td>136</td>
<td>112</td>
<td>248</td>
</tr>
</tbody>
</table>

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Sami Hameed Kadhim Al-Khattat1et al. the non-discriminated items (2items), bringing the number to 62 items.

5.6. Reliability

The scale must be characterized by a degree of consistency and reliability that make the results obtained from it reliable (Vallee, Lobry, & Deblecker, 2008). Therefore, the Cronbach’s Alpha equation was applied to find the internal consistency of the items. Scale item if deleted) were raised (2) items to raise the value of internal consistency to (0.82), which is sufficient to show the internal homogeneity of the items of the scale (Mohammed, 2017).

Thus, the scale is ready for application in its final form consisting of (40) items. Since items (1 - 8) refer to the first area (laboratory safety), while items (9 - 16) refers to the second area (chemical pollution), and items (17 - 24) refers to the third area (education Items (25 - 32) refer to the fourth area (food education), while items (33 - 40) refer to the fifth area, which is the area of public ecological care.

5.7. Method Application:

The researchers applied the research tool to the training-teachers of University of Al-Qadisiyah during

Table 2 T-Test Results to Detect the Difference Between the Hypothetical Mean and The Arithmetic Mean of the Scores of the Research Sample on the Ecological Awareness Scale

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Hypothetical Mean</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>T- Value</th>
<th>Sig. 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training-Teachers</td>
<td>248</td>
<td>20</td>
<td>29.6</td>
<td>6.92</td>
<td>21.81</td>
<td>Significant</td>
</tr>
</tbody>
</table>

From the observation of Table (2), the calculated t-value was much higher than the tabular value, which means that the students applied from the chemistry and Biology departments have sufficient ecological awareness. This result can be attributed to the fact that the scientific materials they deal with are mostly of nature. The process employs laboratories, and laboratory safety procedures have made them aware of some ecological awareness, which could be reflected on the awareness of their students in the future.

6.2. Presentation, Analysis and Discussion of the Results of the Academic Achievement Prediction in Terms of the Areas of Ecological Awareness Scale

To achieve this goal, multiple regression analysis was used based on the stepwise regression method by introducing independent variables sequentially, one after the other, by sequential steps to the model, excluding those variables that are weak and ineffective by the presence of other variables (Allison, 1999; P. Cohen et al., 2014). The results show that independent variables (areas of ecological awareness scale) contribute to the dependent variable (academic achievement), as shown in Table (3).

Table (3) Contribution of Ecological awareness variables (laboratory safety, chemical pollution, food education, health care, ecological care) to academic achievement

<table>
<thead>
<tr>
<th>No.</th>
<th>The Standard Error Rate Of Estimation</th>
<th>Adjusted Correlation Coefficient Square</th>
<th>Determination Coefficient R2 Square</th>
<th>Correlation Coefficient R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.433a</td>
<td>0.187</td>
<td>0.180</td>
<td>3.316</td>
</tr>
</tbody>
</table>

a. Prediction: (Fixed) the field of air pollution, the field of biosphere, the field of chemical pollution, the field of health care associated with human life, and the field of public care for the environment.

b. Dependent Variable (Academic Achievement).

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From the observation of Table (3) above, it is found that there is a positive correlation between (the field of air pollution, the field of biosphere, the field of chemical pollution, the field of health care related to human life, and the field of general care of the environment) and between academic achievement.

7. CONCLUSIONS
Services in the College of Education from the Chemistry and Biology Departments enjoyed some ecological awareness.

The absence of significant differences between the two specializations Department of Chemistry and Biology for students of the Faculty of Education at the University of Al-Qadisiyah in ecological awareness.

8. RECOMMENDATIONS
In order to generalize interest, the present study makes the following recommendations:

The inclusion of scientific material in one of the stages of study of the Department of Chemistry concerned with the ecology and not limited to the subject only departments of Biology.

Conducting seminars and meetings sponsored by the University to urge spreading ecological awareness among university students.

9. SUGGESTIONS
The present study also made some suggestions including:

Diversity of research in ecological awareness and attention to each of its areas separately and the development of means, solutions and approaches to ensure the development of each area in particular.

Identify the ecological awareness of other samples from different universities, ministries and educational stages.

Providing financial incentives for ecological competitions.

Table (4) ANOVAa Analysis of Regression Variability of the Total Determination Factor Value of Ecological Awareness Variables (Air Pollution Field, Biosphere Field, Chemical Pollution Field, Human Life Related Health Care, and General Ecological Care) in Academic Achievement

<table>
<thead>
<tr>
<th>No</th>
<th>Total Squares SS</th>
<th>Degree of Freedom</th>
<th>Squares Median</th>
<th>Calculated Value F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>540.208</td>
<td>2</td>
<td>270.104</td>
<td>24.570</td>
<td>0.000a</td>
</tr>
<tr>
<td></td>
<td>Error</td>
<td>213</td>
<td>10.993</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2881.773</td>
<td>215</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Prediction: (Fixed) air pollution, biosphere, chemical pollution, health care related to human life, and general ecological care.
b. The dependent variable: academic achievement.

References


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Appendix (1) Testing the Ecological Awareness

1. For a relatively unpolluted atmosphere we use fuel:
   a. Coal
   b. Ethyl alcohol.
   c. Gasoline
   d. Diesel.
2. We can reduce air pollution with car exhaust gases by:
   a. Increasing the proportion of lead in gasoline.
   b. Production of large-scale vehicles.
   c. Installation of filters in cars.
   d. Increasing the capacity of the motor car.
3. Getting rid of air pollution is done through:
   a. Dissemination of awareness to preserve the environment.
   b. Spread of gaseous pollutants in the air.
   c. Emission of harmful substances from energy to air.
5. To solve the world's energy crisis without pollution events, we must expand:
   a. Conducting nuclear tests.
   b. Using solar energy.
   c. The use of natural gases.
   d. The use of wood forests.
1. One way to protect the atmosphere from pollution is to use energy from biotechnology:
   a. Animal waste.
   b. Solar batteries.
   c. Natural gas.
   d. Oil and its derivatives.
6. There are air pollutants from cement and brick factories:
   a. The use of precipitators.
   b. Using filters.
   c. Surrounding plants with trees.
   d. Constructing high chimneys.
7. To keep the atmosphere free from pollution, we use clean energy:
   a. Nuclear energy
   b. Thermal energy.
   c. Wind energy.
   d. Fossil fuel energy.
8. To keep the ozone layer free from corrosion of devices containing Freon gas is done through the disposal of residues:
10. To prevent the waste container from air pollution we must:
   a. Turning the waste container in the street.
   b. Covering the waste container.
   c. Cleaning the waste container uncovered.
   d. Burning the container and harmful waste inside.
11. To solve the problem of apparent rise in air temperatures we must:
   a. Reduce pollution from industrial processes and refining.
   b. Maintain the water level from decline and drought.
   c. Preservation of soil from erosion and cultivation.
   d. All the above possibilities.
12. The best way to dispose of air polluting wastes is through:
   a. Special furnaces for burning waste in homes.
   b. Huge gatherings of waste.
   c. Special furnaces with high temperatures.
   d. Incineration in garbage containers on the road.
13. To prevent pollution of seas and oceans from oil spills by oil tankers, we must:
   a. Avoid putting excessive load in the tankers which leads to the explosion of tanks.
   b. Maintenance of oil tankers continuously.
   c. Reporting tankers where oil spills occur.
   d. All the above possibilities.
14. To get rid of wastewater that lead to water pollution is done through:
   a. Discharge to rivers and water bodies.
   b. Discharge into the ground.
   c. Treatment by scientific methods and re-use.
   d. Drying and use as agricultural fertilizers.
15. To keep river water from pollution is done through:
   a. Non-discharge of sewage into rivers.
   b. Construction of dams and reservoirs in rivers.
   c. Fishing by electric shock.
   d. Discharge of industrial effluents into rivers.
16. Pollution of the aquatic environment by insecticides can be reduced by:
   a. Training workers in the use of pesticides.
   b. Drying ponds and stagnant marshes.
   c. The use of radiation to sterilize male harmful insects.
   d. All the above possibilities.
17. The most important methods used to remove oil pollutants in the seas and oceans include:
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a. Adding chemicals to the floating oil stains.
b. Spreading activated charcoal powder beneath the net oil surface.
c. Transfer of oil to air by evaporation by heat.
d. Concentrating the rays on the floating oil spots.

18. To maintain the gas exchange between water and air that leads to pollution, we must:
   a. Preventing oil pollution.
b. Preventing radioactive contamination.
c. Reduce air pollution with factory smoke.
d. Prevent pollution by human effluents.

19. In order to keep the soil from contamination, foreign materials that enter their components and make them unfit for agriculture should be disposed of as:
   a. Waste.
b. Insecticides.
c. Fertilizers in large quantities.
d. All the possibilities above.

20. To eliminate soil salinization is done through:
   a. wasteful irrigation of crops.
b. Irrigation with salt water.
c. frequent use of chemical fertilizers.
d. Irrigation with river water.

21. Sand encroachment is considered as a natural phenomenon that pollutes the biosphere and can be reduced through:
   a. Planting trees.
b. Plowing the land.
c. Sprayed with water.
d. Increase chemical fertilizers.

To prevent the impact of floods and floods must work on:
   a. Early warning of their occurrence.
b. Elevation of buildings in low places.
c. the work of reservoirs to save water floods and floods.
d. Afforestation of desert areas.

23. To preserve the soil from pollution in natural slums, this is done through:
   a. Cutting trees.
b. Burning trees.
d. Enact laws for the protection.

24. To reduce the extinction of plants and animals that affect the biosphere through:
   a. Encourage hunting in the breeding season.
b. Forest burning for disposal.
c. Illegal fishing.
d. Prohibition of fishing in the breeding season.

25. To solve the problem of pollution with heavy metals resulting from factories that pollute the soil we are working on:
   a. underground burial.
b. Follow factories to environmental conditions

26. For the disposal of medical waste that contaminate the soil health authorities adopt the method:
   a. Burial.
b. Thermal disposal.
c. Burning.
d. Throwing the waste into the sea.

27. Nuclear waste contaminating the biosphere is eliminated through:
   a. Burning in distant places.
b. Deep burial.
c. Disposing in the desert.
d. Processed technically.

28. To dispose of electronic waste that contaminate the soil, it is preferable to:
   a. Recycling.
b. Throwing the waste into the sea.
c. waste burial.
d. All the possibilities above.

29. To eliminate the frequencies emitted by mobile phone stations that cause environmental pollution and human diseases, we must:
   a. Placing mobile phone stations inside residential areas.
b. High towers for mobile phone stations.
c. Increases the number of receivers and transmitters in the towers of mobile phone stations.
d. Placement of mobile telephone stations in remote locations.

30. To keep the house free from cooking smoke pollution preferably:
   a. Open doors and windows during the cooking process.
b. Put the cook near the window.
c. Operation of air fans in the kitchen.
d. Open the vacuum deformation clouds smoke during the process of cooking.

32. To prevent air pollution inside the rooms when using oil guns preferably:
   a. The door of the room is closed well when using the oil heater.
b. Leave the door of the room open. Slightly when using the oil heater.
c. The heater is full of oil and is burning.

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d. Cleaning and maintenance of the heater from time
to time.

33. To keep the water in the water tanks in the house
from contamination, we must:
   a. cleaned every now and then.
   b. maintenance and replacement of damaged ones.
   c. Close these tanks with a lid.
   d. All the above possibilities.

34. To keep your hands and clothing from burns and
pollution when carrying the car battery, we must:
   a. Quick pulling while on the ground.
   b. Carrying it in a diagonal manner so that it is in
contact with clothing.
   c. Carrying them from the place allocated without
approaching bring them closer to clothing.
   d. A + B together.

35. To preserve human health from the food it eats
from street vendors, we must:
   a. Preventing them from selling on the street without
giving them a license from health.
   b. Spreading the cultural awareness of the danger of
eating exposed foods.
   c. subjecting street vendors to health control and not
allowing them to sell without obtaining a health
license.
   d. All the above possibilities.

36. To keep the streets and parks from waste we must:
   a. Avoiding littering dirt and waste in the streets and
public parks.

37. To get rid of pollution and noise caused by
   generators, we must put generators:
   a. near hospitals.
   b. Inside residential areas.
   d. Near schools.

38. Noise can be controlled by:
   a. Keep schools away from crowded residential areas.
   b. Reducing the cultivated green areas.
   c. Exposure to machine noise inside factories.
   d. Excessive use of alarm machines.

39. In order for a person not to have professional
deafness, s/he must:
   a. Exposure to aircraft sounds.
   b. presence in places.
   c. Rocket Launch.
   d. No exposure to machine noise inside the factory.
   e. Exposure to atomic explosions.

40. The phenomenon of smoking prevails in all
societies and has implications for human health in all
its organs and to reduce this phenomenon is preferred:
   a. Prohibition of smoking in public places and
transport.
   b. Issuing murals showing the impact of smoking on
health.
   c. Screening of films on the TV screen showing the
impact of smoking on health.
   d. All the above possibilities.