RURAL STUDENTS COGNIZANCE ON ENERGY CONSERVATION

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Domestic energy demand is determined by many factors like, demographic variables, socio-economic variables, employing energy efficient appliances, activities of the consumers and so on. In the present world, energy usage and energy efficiency are on increasing concern. The purpose of this paper is to determine the student's level of knowledge on energy and environment. This study also examines the environmental concerns of the students. The results show that students have fairly high knowledge on environment but, limited knowledge on energy. In addition the study also indicates that the students have high concern towards the environment. The main findings of this study reveal that there is a need to enhance the student's awareness and knowledge of energy-saving measures.

Keywords: Energy conservation, knowledge, students

Introduction

Environment has emerged as the most debatable issue of present time. Concerns on the environment have increased gradually among the public. Since many environmental problems are connected with human consumption, the problem of conservation has been brought down to the consumer level. Accordingly consumers are prone to take some responsibility to reduce environmental damage through the consumption of environmentally friendly products and behaviour. To overcome the energy problems, education and awareness are viewed as the important factors. Sustainable development is referred to as development which must be carried out continuously without damaging the rights of future generations.

An increase in energy consumption puts more demand on the power plant that supplies the electricity. Many power plants burn fossil fuels like coal to generate power. This produces carbon-dioxide and other greenhouse gases. Energy is critical, directly or indirectly, in the entire process of evolution, growth and survival of all living beings and it plays a vital role in the socio-economic development and human welfare of a country. Energy conservation has emerged as one of the major issues in recent years. Conservation and efficient utilization of energy resources play a vital role in narrowing the gap between demand and supply of energy. Improving energy efficiency is one of the most desirable options for bridging the gap in the short term.

Energy Star started out as a US standard, but was quickly adopted throughout the world. Most energy rating systems around the world are built on the Energy Star Model. The Bureau of Energy Efficiency is an agency of the Government of

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India, under the Ministry of Power formed in March 2002. The primary objective would be to reduce energy intensity in the economy. The agency builds up program which will increase the conservation and efficient use of energy in India. The first product for which the rating applied was computer monitors. Energy Star now applies to diverse products like computers, heaters, air conditioners, lights, electronic products and even homes.

In May 2006, the Bureau of Energy Efficiency, which functions under the Ministry of Power, launched a standards and labeling program for home appliances. Manufacturers of home appliances can affix BEE Star Labels to guide consumers while buying an appliance. The star ratings range from one to five. The more number of stars, the more energy efficient the appliance is. The Energy Star label in the Home Appliance means that it uses less energy. This not only benefits the environment, but also reduces the cost for the people who use them. Using Energy Star rated home appliances results in significantly reduced energy costs. Refrigerators, water-heaters, air-conditioners and other such products form a major part of power usage in a household. The energy difference is seen in long run.

Objectives of the Study

(1) To investigate the level of knowledge toward environment and energy among the students.

(2) To investigate the level of knowledge toward energy conservation among the students.

(3) To examine the attitude of college students towards the environment in general.

(4) To analyse the influence of demographic variable on knowledge of energy conservation of students.

Literature Review

Elvan Sahin *et al.* (2012) [1] observed the links among attitudes, values, and behaviors pertaining to sustainability, participation in outdoor recreation as well as gender and students watching mass media. They constructed a structural equation model. They found that gender is a strong factor in sustainability-related attributes. Female students have a higher tendency to follow mass media. They have more favorable attitudes and behaviors toward sustainable life styles, and more ecocentric values. Attitudes and values were significant determinants of students' behaviors pertaining to sustainability. Higher tendency to follow media yielded more favorable attitudes, higher levels of ecocentric values, and engagement in outdoor recreational activities such as walking, bird watching, and camping.

Adele Berndt and Lucy Gikonyo (2012) [2] investigated environmental behaviour (both purchasing and non-purchasing behaviour) in an African context. Convenience sample was used to select the respondents. Statements reflecting non-

purchasing behaviour indicated lower mean scores when compared to purchasing behaviour statements. Statistically significant differences were found to exist between different age groups with respect to both purchasing and non-purchasing behaviour. Differences also found between nationalities with regard to their purchasing behaviour.

Brett L. M. Levy and Robert W. Marans (2012) [3] reported that five factors that influence individuals' pro-environment behaviors: knowledge of issues; knowledge of procedures; social incentives; material incentives; and prompts/ reminders. They recommended that University of Michigan should practice three types of activities to support the growth of pro-environment behaviors. They are education, engagement, and assessment. Elham Rahbar and Nabsiah Abdul Wahid (2010) [4] examined in their study whether different ethnic groups display different opinion on eco-label. Three ethnic groups were taken for the study, Malay, Chinese and Indian. The results show that three major groups in Malaysia differ in their awareness, recognition and perception of the eco-label.

Booi-Chen tan and Teck-Chai lau (2009) [5] in their study found that there were no significant differences between gender and courses taken to study with consumers overall sustainable consumption behaviour. The study also shows that young consumers demonstrate a moderate level of sustainable consumption behaviour and concludes that there is no cause of concern for over-consumption behaviour among young consumers.

Magda M. Abd El-Salam *et al.* (2009) [6] examined the level of environmental knowledge among preparatory school students in Alexandria, determining their attitudes towards some environmental concepts, and assessing the effect of EE on these knowledge and attitudes. The study sample was selected by stratified random method, and the assessment was conducted using a questionnaire. 77% of the students had poor level of environmental knowledge and 23% had fair level. 80% of the students were found to have negative attitude toward the environment and the remainder 20% were indifferent. That knowledge and attitudes were positively correlated to their socio-economic levels. Following six EE sessions, an improvement in their knowledge and attitudes was observed where 69% of the students had a satisfactory level of knowledge and 88% had positive attitude toward the environment. Attitude was found to be positively correlated to their level of knowledge prior to and following the EE sessions. These results support the need for development and implementation of environmental education programs as part of the regular school curriculum.

Harald Throne-Holst *et al.* (2008) [7] in their study identified the households' barriers to energy saving solutions. Six types of barriers are introduced. Out of which three barriers were found to be relevant in this study. They were Cultural-normative, economic and information.

Kiran Sharma and Ravi Sharma (2005) [8] had focused the issue of implementation of environmental education to enhance the participation, attitude and knowledge level concerning the environment. The survey was conducted in different departments having environmental science as the subjects were analyzed. The students were selected randomly. Likert scale was used in the questionnaire to collect the data. The result shows that students with environmental education show more positive attitude, knowledge and overall participation level. However the correlation between the attitude and participation level scores among the students of environmental category was very weak. It point out that many serious gaps are present in the implementation of environmental education.

Ernesto lasso de lavega (2004) [9] in his study investigated the following groups: environmental specialists, high school instructors, high school students, and the parents of their environmental attitude, knowledge, and awareness (AKA). 27 environmental specialists, 15 high school instructors, 224 high school students, and 222 parents were included. The study found statistically significant differences among the groups regarding the levels of awareness, knowledge, and attitude as related to environmental issues. The environmental specialists scored highest for all AKA variables as compared to the lowest levels presented by parent awareness, parent attitude, and high school student knowledge. Factors such as socioeconomic status, ethnicity, and preference of leisure activities resulted in differences among the groups regarding their levels of environmental AKA.

Research Methodology

We conducted a survey-based study among the rural college students in Vellore district. Survey questionnaire was used to gather data. A total of 209 respondents completed the full questionnaire. The respondents were asked to fill each item in the questionnaire on yes, no and don't know type. Simple random sampling was used to select the respondents. The students completed the survey during class time. The respondents were final year undergraduate and post graduate students. Respondents consisted of both sexes. For analysis, Chi square test was used to test the hypothesized relationship.

FINDINGS & DISCUSSION

Demographic Variables

TABLE 1: PROFILE OF THE RESPONDENTS

Variables	Frequency	%
Gender		
Male	100	47.8
Female	109	52.2

contd. table 1

Variables	Frequency	%
Level of Education		
UG	169	80.9
PG	40	19.1
Ownership of House		
Own house	186	89
Rented house	23	11
Type of House		
Nuclear Family	129	61.7
Joint Family	80	38.3
Rooms in the house		
1-2 Rooms	96	45.6
3-4 Rooms	92	44.0
5 and more Rooms	21	10.0
Monthly Income		
Less than Rs.10,000	137	65.6
10,001 – 20,000	14	6.7
20,001 – 30,000	48	23.0
30,001 – 40,000	10	4.8

TABLE 2: KNOWLEDGE AND GENERAL PERCEPTION OF RESPONDENTS ON ENVIRONMENT AND ENERGY

Survey Question	Yes		No		Don't Know	
	Frequency	%	Frequency	%	Frequency	%
Do you know that energy (petrol, diesel, electricity, LPG gas) is a challenge for India?	165	78.9	15	7.2	29	13.9
Do you know about what is global warming?	142	67.9	16	7.7	51	24.4
Do you know about the consequences of global warming?	184	88.0	4	1.9	21	10.0
Do you know that polluted environment leads to Global warming?	173	82.8	12	5.7	24	11.5
Do you know that global warming causes heath problems to human being?	188	90.0	4	1.9	16	7.7
Do you know that most of the electricity-producing power plants use coal as fuel?	162	77.5	13	6.2	34	16.3
Do you know that Production of electricity and consumption of electricity both add a significant amount of carbon-di-oxide to the atmosphere.	108	51.7	28	13.4	73	34.9
Do you know that the release of certain gases from our daily activities in homes and roads mixing in the atmosphere cause global warming?	173	82.8	9	4.3	27	12.9
Do you believe that one unit of electricity saved is equal to two units produced?	120	57.4	32	15.3	57	27.3

Table 2 shows the knowledge and general perception of respondents on environment and energy. More than 78% of the respondents indicated that energy is a challenge for India. More than 80% of the respondents were aware of the effects of global warming. Half of the respondents only knew that production as well as consumption of electricity both adds a significant amount of carbon-dioxide to the atmosphere. More than 82% of the respondents know that the release of certain gases from our daily activities in homes and roads mixing in the atmosphere cause global warming. This is a fairly high %age. But only 57% of the respondents believed that one unit of electricity saved is equal to two units produced. These research findings indicate that there is a need to enhance consumers' awareness and knowledge on environment and energy.

TABLE 3: AWARENESS AND GENERAL PERCEPTION OF RESPONDENTS ON ENERGY- SAVING.

Survey Question	Yes		No		Don't Know	
	Frequency	%	Frequency	%	Frequency	%
Compact fluorescent light bulbs use up to 75 % less energy than standard light bulbs.	120	57.4	20	9.6	69	33.0
We can save energy by turn off the lights when not in use	195	93.3	5	2.4	9	4.3
We can save energy by turn off the fan when not in use	195	93.3	10	4.8	4	1.9
Frequent opening of refrigerator door consumes more energy	140	67.0	22	10.5	47	22.5
Setting computer monitor to sleep-mode when not in use saves energy by approximately 40%.	144	68.9	13	6.2	52	24.9
By adjusting the A/C temperature from a minimum point to, few points more will save energy by maintaining the same room coolness.	58	27.8	23	11.0	128	61.2

Table 3 shows the knowledge and general perception of respondents on energy-saving. More than 92 % of the respondents indicated that energy can be saved by turn off the unused lights and fan. This is a fairly high percentage. But only 57% said they know Compact fluorescent light bulbs (CFL) use up to 75 % less energy than standard light bulbs. More than 67 % of the respondents revealed that they know frequent opening of refrigerator door consumes more energy and setting computer monitor to sleep-mode when not in use saves energy by 40%. Only 28 % of the respondents are aware of energy saving by adjusting the A/C temperature. These research findings indicate us that there is a need to enhance consumers' awareness and knowledge of energy-saving.

TABLE 4 SHOWS THE AWARENESS OF BEE AND ENERGY STAR LABEL

Variable	Yes		No	
	Frequency	%	Frequency	%
Do you heard about BEE (Bureau of Energy Efficiency)?	28	13.4	181	86.6
Do you heard about Energy Star Label?	62	29.7	147	70.3

Interpretation: The result indicates that only 13 % of the respondents were aware of the BEE agency and 29 % of the respondents were aware of the Energy star label.

TABLE 5: SOURCES OF INFORMATION TO RESPONDENTS ABOUT ENERGY STAR LABEL

Media	Frequency	%
Internet	26	12.4
Television	27	12.9
Newspaper	26	12.4
Word of mouth	18	8.6
Friends/ relatives	21	10.0
Pamphlets	2	1
Books	10	4.8
On the product	22	10.5

Interpretation: The results show that those who knew about energy star label, were aware through the following sources of information. Internet, television, newspaper, friends and symbol on the product.

TABLE 6: RESPONDENTS' ATTITUDE TOWARDS THE ENVIRONMENT

Levels of concern	Frequency	%
Low concern	47	22.5
High concern	162	77.5
Total	209	100

Interpretation: The result indicates that more than 77 % of the respondents were highly concerned towards the environment. 8 % has low concern and remaining 14 % has neutral concern towards the environment.

DATA ANALYSIS AND INTERPRETATION

Analysis was carried out using SPSS package. The responses of yes, no and don't know (three categories) were grouped into two; one with responses of yes and the other group having the no and don't know. These responses were compared and tested with pearsons' chi-square test.

Chi-Square Analysis

1. H_o = Knowledge on CFL bulb energy consumption and gender are independent.

    H_1 = Knowledge on CFL bulb energy consumption and gender are dependent.

Interpretation

Chi-Square test reveals that the Sig. value is .007, which is less than P value of 0.05, we reject the null hypothesis and accepted the alternative hypothesis and conclude that Knowledge on CFL bulb energy consumption and gender are dependent.

2. H_o = Knowledge on energy saving by turn off the unused lights and gender are independent.

    H_1 = Knowledge on energy saving by turn off the unused lights and gender are dependent.

Interpretation

Chi-Square test reveals that the Sig. value is .699, which is more than P value of 0.05; we accepted the null hypothesis and conclude that Knowledge on energy saving by turn off the unused lights and gender are independent.

3. H_o = Environmental attitude of the students and gender are independent.

    H_1 = Environmental attitude of the students and gender are dependent.

Interpretation

Chi-Square test reveals that the Sig. value is .865, which is more than P value of 0.05; we accepted the null hypothesis and conclude that Environmental attitude of the students and gender is independent.

4. H_o = Environmental attitude of the students and their level of education are independent.

    H_1 = Environmental attitude of the students and their level of education are dependent.

Interpretation

Chi-Square test reveals that the Sig. value is .092, which is more than P value of 0.05; we accepted the null hypothesis and conclude that environmental attitude of the students and their levels of education are independent.

Conclusion

Global environmental disaster has created an expectation that improved understanding and awareness of ecological concepts would be one way of overcoming the growing crisis. Knowledge is supposed to be the first step towards

environmentally responsible behavior. From the research findings, several meaningful policy implications can be deduced. Respondents have considerably high level of understanding on environment. Education on government energy efficiency polices needs to be further enhanced given that the awareness of the consumers on energy and energy-saving is not high enough. The government needs to use a wide range of information delivery channels on government policy and energy saving knowledge in order to effectively and efficiently reach and cover different groups of consumers.

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