

Assessment of Energy Conservation Literacy in the Higher Education Students of Abbottabad, Pakistan

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Assessment of energy conservation literacy is desirable that may lead to reducing the growing energy supply and demand gap. The energy conservation literacy is the competency and motivation to use energy knowledge in a useful manner to practice, to communicate, and to participate in society to conserve energy. Consumer behaviour makes out energy conservation. The primary concern of this study is to measure the knowledge, attitude and practice in relation to energy availability and its utility; in students of Higher Education Institutions. The study measured views and behavioural trends among the students by utilizing the Knowledge, Attitude, Practice, analysis method. The sample population was 150 students from 12 departments of COMSATS Institute of Information Technology, Abbottabad. The results show that students have positive trends in knowledge, attitude, and energy conservation. Recommendations are offered on how the movement can be built, thereby to insinuate youth in civil society to manage the energy demand for sustainable development.

Keywords: *Energy conservation literacy, higher education, knowledge attitude (map) analysis, Pakistan*

Introduction

Energy literacy has great significance while making clued-up decisions for efficient energy use by both individual and the society. Energy conservation can't grow among the people without the basic information to utilize energy in household and work activities (Brewer, Stephen, 2013). There is a clear relationship between energy literacy and behavioural patterns of energy conservation (Schwartz, Deneff, Stevens, Ramirez, & Wulf, 2010). Thus, it is evident that the understanding of impacts and consequences of energy use makes the person energy literate for better energy demand management. Despite the increase in energy knowledge energy

conservation behaviour and its awareness lacks among students (DeWaters and Powers, 2011). Energy consumption is influenced by the behaviour of consumers based on comfort and income levels (Jabeen, Umar, Zahid, Batool, Zaman, 2014). The intensity of energy use depends on the required level of the consumer. Consumer behaviour regarding energy consumption can be modified without reducing its utility level (Apolinario, 2009). Energy conservation using Demand-side management (DSM) focuses on modifying the practices and behaviour of consumers by minimizing their use of electricity. This is done by spreading awareness to tune the mindset regarding

interaction with the appliances (Samad, 2013). Practices play the fundamental role as the determinants that influence the level of demand. Certainly, energy conservation behaviour depends on practices which are embedded. The people get “locked-in” their day to day energy consumption behaviour. Some examples of energy conservation behaviour are indicated; by turning off the light once one leaves a room if no one is in there, turning off one’s computer when not in use, using energy saving bulb and unplug appliances or switching them off when they are not in use and other behaviours this will reduce the energy usage dramatically (Alias, Hashim, Farzana, & Mariam, 2015). Steg says that there are a number of ways for energy conservation but mounting people's knowledge, making them realize energy problems, or encouraging contextual changes leading to behaviour changes needs to be promoted (Steg, 2008). Eiswerth also supports the idea that in the present day it is vital to promote our energy conservation patterns. The recommendations to conserve energy can only be suggested once the present behaviour towards energy conservation is studied carefully (Eiswerth, Abendroth, & Ciliano, 1998).

Energy Conservation Issues in Higher Education -- Energy conservation depends

on consumer behaviour while utilizing energy. The energy conservation research literature is found less attentive to the development of Higher Education Institutions (hereafter HEI) students’ ‘energy conservation literacy’ (DeWaters and Powers,2011). Students of HEIs are one of the main contributors towards misuse of energy, especially by their behavioural pattern. Universities are found to face the difficulty to save energy as no clear target to reduce the energy use is identified by the authorities and realized by the students. Therefore there is a need to assess the energy conservation trends among the students based on behavioural patterns. It may help to synthesize the idea of efficient use of energy to equalize the supply and demand; furthermore to reduce the footprints on the ecosystem (Ishak, Iman, & Sapri, 2012). Since the 1973 international energy crises, the states and societies have embarked on to produce more energy and to use less energy. The crisis called for energy conservation behavioural pattern, to control the energy demand (Chateau & Lapillonne, 2011). To serve the sustainable development goals 2015 there is a desire for change in the mindset; a move from a supply increase to demand decrease approach. The policies must be designed to have “energy efficiency”, by emphasizing less “energy inputs” to embrace “effectiveness of

energy use” plus “energy services,” (Samad, 2013). The study premises to highlight energy conservation practices as a determinant factor (Markechal, 2010) to manage energy demand while the specific objectives are as follow:

1. To assess the energy conservation literacy among the students of COMSATS Institute of Information Technology, Abbottabad, Pakistan.
2. To indicate the probable energy conservation potential in HEI based on primary data.

To locate the healthy forces for energy conservation the study follows below questions:

- i. What is the level of energy conservation literacy among the students of COMSATS Abbottabad?
- ii. How to identify the civil society in HEIs to conserve energy?

Research Methodology

The paper is guided by the principle: energy conservation is not conditioned only with the energy conservation technologies but it is contextual to energy conservation behavioural patterns. The theoretical framework of this paper counts practical patterns promoting energy conservation to improve the quality of life. The energy conservation literacy links the

correlation between energy efficiency and energy demand management. The study hyphens the following variables:

- Dependent variable = Energy demand management
- Independent variable = Energy conservation literacy

The paper measures the Independent variable of energy conservation literacy to present the primary data regarding healthy forces in HEI to promote energy conservation.

Methods of Data Collection-- Energy conservation behavioural patterns among the students are of considerable importance. Students’ daily life energy consumption practices impact on energy consumption style of students in university as well. Their consumption pattern becomes a part of their lifestyle which continues to have a wider influence. It needs to be realized that the institutions have a social responsibility towards conserving the energy. For that matter, questionnaires were served out among students from all 12 departments of COMSATS, Abbottabad campus. The sample size (n) as per objective of the study was one fifty students (n=150); these students represent the energy conservation literacy defined as energy knowledge, attitude and practices prevalent in the HEI.

Knowledge, Attitude, Practices (KAP) Analysis Method based questionnaires--

The method of “KAP” analysis measures the Knowledge, Attitude and Practices of a group/community. The method is helpful to assess the literacy of a group/community. KAP analysis explores the knowledge, Attitude and Practices of a particular group referred specific problem. The paper utilizes a structured KAP questionnaire to assess the prevalent socio-economic trends among the students regarding energy conservation. A Questionnaire was constructed with three gears of prompts to evaluate the knowledge, attitudes, and practices of the students of CIIT COMSATS Abbottabad (see Annexure). This questionnaire is not provided by the secondary data. The questions were simple and clear to facilitate the respondents’ maximum. The respondents were supposed to move from general to specific answers. To reach out the prevalent trends for energy

conservation; 150 students were selected as the idea of convenient sampling to insinuate the possibility of energy conservation.

Data Analysis

Frequency distribution was the benchmark to tabulate the data for this paper. Statistical description prevailed.

Results and Discussion

This study surveyed the knowledge, attitude and practices regarding energy use and energy conservation of CIIT, COMSATS students of Abbottabad. The results of the study are focused on the student’s answers to understand the basic level of energy conservation knowledge, attitudes and practices in which students are found engaged. The study shows that mostly the students were well aware of the present situation of the energy crisis in Pakistan. The study also found that most of the students have positive attitudes toward energy conservation.

Table 1
Energy Conservation Knowledge

K:	Realization of the role of energy in society and daily life	YES	NO
K1	We are facing energy crisis because of more demand than supply	81.33%	18.67%
K2	Energy saving will improve/change the situation	80.66%	19.34%
K3	The energy bill will be reduced	71.33%	28.67%

K4	The quality of life will improve, as you will get an extra amount of money for social relation or excursion	73.33%	26.67%
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According to the study, the respondents were conscious about the energy crisis in Pakistan. K1 demonstrates that 81.33% students are well aware of the present situation of the energy crisis in Pakistan. The respondents acknowledged that this is because of more demand than supply. K2: 80.66% respondents agreed with the idea that if energy is saved than the situation of suffering through energy crisis will reduce. The students showed an understanding of the relation between saving energy that will help to manage the situation of the energy crisis. K3: It was asked what do you think that the energy bill will be reduced in the consequence of energy saving. 71.33 % students agreed upon the

positive relationship between energy conservation and the monthly billing of energy. K4: Furthermore 73.33% respondents acknowledged that there is an inverse relationship between a reduction in bill and improvement in the quality of life. students agreed that this saving can help improve their quality of life as they think that the extra amount of money saved from energy bill can be spent on social relations or excursion. A high level of knowledge was observed among the respondents regarding the present situation of the energy crisis. In general, students believed that energy saving will improve the present situation of the energy crisis.

Table 2
Energy Conservation Attitude

A.	Do you account energy conservation in your attitude?	YES	NO
A1.	We should constrain (reduce)ourselves from using energy	53.33%	46.67%
A2	We should use energy efficient appliances	86.66%	13.34%

In this section of the study, questions were asked to explore the attitude of respondents regarding energy conservation. 53.33% respondents agreed

that they should constrain themselves from using energy. 86.66% respondents supported that they should use energy efficient appliances. The above

relationship concludes that attitude is linked with the behaviour, intention and ultimately the actions performed by the end user. The data collected from the study shows that respondents are well aware of the importance of using energy efficient appliances and they have a positive attitude towards using it. A neutral attitude

observed among students when reducing the energy consumption was the subject of the question. Comparison of K2 (80.66%) and A1 (53.33%) showed a contradiction in the opinion of a student regarding energy saving by reducing their energy consumption in order to conserve energy.

Table 3
Energy Conservation Practices

P.	Practices opted for energy conservation	YES	NO
P1	Do you choose energy-saving practices at home?	86%	14%
P2	Do you use energy saving bulbs and appliances?	62.66%	37.34%
P3	Do you use on of lights?	55.33%	44.67%
P4	Do you favour to perform high energy tasks at times, when the cost is lower?	36%	64%
P5	Do you set off household appliances while not in use?	61.33%	38.67%

This part included the data related to the practices opted by respondents for energy conservation. Energy saving practices were found among 86% of the respondents. To further investigate relevant practices were specifically asked by each student. P2: 62.66 % of the respondents said that they use energy saving bulbs. This was in line with the previous question of usage of energy efficient appliances. P3: the result explored that 55.34% of the respondents use daylight. This is related to the concept

of energy conservation without the application of technology. P4: the usage of an energy-intensive task during off-peak hours was investigated. Only 36% of the respondents reported that they try to use energy at off-peak hours. P5: it was explored that whether the respondents switch off unnecessary lights. The respondents who observed this practice were 61.34% of the sample population for this study.

Table 4
Energy Conservation Communication

ECC	Tell us your way to extend your energy conservation style to	YES	NO
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others			
ECC1	Would you be interested in participating in energy saving activities in future?	85.33%	14.67%
ECC2	Would you be interested in participating in an energy awareness campaign in the future?	75.33%	24.67%

ECC1: 85.33% positive response was given by the respondents to participate in the energy-saving activities in the future. ECC2: To further explore the interests of respondents it was asked what would you be interested in energy saving campaigns. 75.33% of the respondents acknowledged that they will be interested. It is important to emphasize here that only a well energy literate person can communicate about energy conservation in meaningful ways. Students of COMSATS have shown a positive attitude towards performing energy conservation activities and campaigns. The degree of awareness for energy conservation is commensurate with the current challenge. The students, therefore, need to be led and channelize them prudently in order to bring forth tangible energy demand management.

Conclusion and Recommendations

Energy conservation literacy includes substantial behavioural practices based on knowledge leading the empowered

individuals to make informed energy-related choices and actions in everyday life. This study has shown that the energy conservation literacy level among CIIT COMSATS students in Abbottabad is found 70%. The peak hours of energy utilization are not realized by the respondents in view of energy conservation. The study premises the energy consumption trends among the students of higher education. The information must be utilized in energy demand management strategies at the higher education level and in the society as well. Policies and programs can be initiated to save energy. Students’ energy usage patterns can be utilized by higher education management services and stakeholders. It can benefit the fiscal policies of universities. It has been noted that the students are quite aware of the present situation of energy and they intend to have a positive inclination towards participating in energy conservation

campaigns; a task force can be made of these students to circulate the idea to other people. Such healthy forces can motivate people for a better future by having energy conservation prone decisions. Recognizing the energy conservation potential among the university students all the activities should be designed by following energy efficient manners. The university can be set as a model of energy conservation by raising energy conservation literacy among students and staff. The guidelines for energy conservation could be opted by COMSATS Institute of Information Technology as follows:

1. Energy conservation literacy must be added to the compulsory curriculum of the university. Besides efficient energy know-how must be highlighted as the benchmark of quality life. Such sort of informal and formal education would ensure the sustainable development and political stability of the society.
2. Social fencing can become practical with the appointment of an Energy Warden by each department of the university. The Energy Warden shall be powerful enough to monitor the student and staff at the departmental level to keep intact the measures for energy conservation.

The way forward-- A healthy competition within the buildings of university or

campuses can be conducted by setting a target for energy conservation among students.

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