Relative Study of Students Awareness & Usage of Green Computing with respect to Gender

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ABSTRACT

Green Computing is the emerging computing technology. It is mainly used to save and protect environment as well as optimize energy consumption and try to keep green environment. It also refers to environmentally sustainable computing. Saving energy or reduction of carbon footprints is main aspects of Green Computing. This research is mainly focusing on to check awareness and usage of green computing with respect to gender. A questionnaire was prepared to check the level of awareness and usage of green computing. The questionnaires were given to 105 students. Now a days all students use computer for their study/ work. Less than 50% of all the students are aware about green computing it means most of the students are not aware about green computing. The research finding established that more awareness is required in order to make IT users to take greener approaches of using technology its peripherals devices.

Keywords: e-Waste, Energy Conservation, Green Computing, Recycle**.**

Introduction

Global Warming is the biggest problem faced by the whole world. Everyone is using computer for their daily works. Due to internet, usage of IT applications is increasing tremendously in daily life. IT has become an integral part of our lives. Due to the large amount of usage of IT applications, the impact has made significant change on the environment. Use of computer increases the level of carbon dioxide (CO_2) in the atmosphere. CO_2 is the green house gas. An increase in the carbon dioxide (CO_2) content in the atmosphere would cause more heat to be retained by the atmosphere and leads to global warming.

What is Global Warming?

Global warming is the rise in the average temperature of Earth's atmosphere and oceans. It happens when carbon dioxide, water vapour, nitrous oxide etc. trap heat and light from the sun in the earth's atmosphere, which increases the temperature.

What is e-Waste?

e-Waste is called as electronic waste. e-Waste is a waste consisting of any broken or discarded electronic devices. Only 15-20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators. Landfill sites are patches of land, where e-Waste materials are dumped for disposal.

An improper handling of discarded electronic devices such as dismantling (taking apart) without any proper controls or simply tossing the materials in the trash which exposes hazardous chemical compounds. These compounds are known for their negative effects on human body, animals, plants and environment also. This will also affect the coming generations. The fact is that very small amount of discarded computers are being recycled. To counter this growing pollution threat all over the world due to the growing use of electronic devices and computers. There is a need to look for an eco-friendly computers and electronic devices.

What is Green Computing?

Green Computing is the term used to denote efficient use of resources. If we use all these resources efficiently it will reduce pollution and all environment problems. Green computing refers to environmentally sustainable computing. Key issues are energy efficiency in computing and promoting environment friendly computer technologies. Green computing is the study and practice of using computing resources efficiently. It reduces the use of hazardous

materials, maximizes energy efficiency during the product's lifetime, and promotes recyclability of defunct products and e-Waste.

Green computing is required to protect environment and save energy along with operational expenses in today's competitive world. That's why in 1992, the U.S. Environmental Protection Agency launched Energy Star, a voluntary labeling program which is designed to promote and recognize energy efficiency in monitors, climate control equipment, and other technologies. ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us to save money and protect the environment through energy efficient products and practices [3].

If everyone applies green computing concept at the time of daily work then it will help to reduce all above mentioned environment problems.

Every big change begins from small initiatives. For example, when you are not using your computer for short span then either switch off monitor or use standby mode option. Same way set the power options on your computer or in phones to switch to sleep mode when it is not in use. This simple change will save a huge amount of energy as well as money. Always try to implement the mantra of 3'R "Reduce**,** Reuse, Recycle". Reduce, reuse and recycle is a good option to minimize the impact of information technology on the environment. Recycling reduces the need for landfill space. It helps to conserves energy, save natural resources and help to protect our environment.

Every person using IT should be aware about green technologies and they should start to demand more environment friendly products.

There is tremendous room for improvement in utilizing the IT equipment efficiently and in environmental friendly manner.

This paper is concerned with conducting the research to check the level of awareness and usage of green computing with respect to gender. The questionnaire as instrument is used to measure the awareness & usage of green computing.

Background:

In Ahmednagar city we face the problems like Load shedding, less rainfall, climate change, temperature increased, etc. Season cycle has been changed.

Green computing is an active research area which studies an efficient use of computing resources. It will help the next generation computer users to think "Green." Hence we decided to see awareness and usage of Green Computing with respect to gender.

Literature review

1] Intended Belief and Actual Behavior in green computing in Hong Kong, Wing S. Chow Yang Chen

This paper has examined IT users' perception of their intended belief and actual green computing behavior. By applying the Theory of Reasoned Action and Theory of Planned Behavior, we verify that attitude subjective norm, and perceived behavioral control over green computing all have a direct effect on intention. This paper determines the most critical factors that contribute to the belief and behavior of green computing. These findings enable green computing researchers and practitioners to firstly concentrate the most important event so that higher priority of understand IT users' belief and behavior about green computing can be enhanced.

2] © International Journal of Combinatorial Optimization Problems and Informatics, Vol. 2, No. 3, Sep-Dec 2011, pp. 39-51, ISSN: 2007-1558. Appasami.G and Suresh Joseph.K

Optimization of Operating Systems towards Green Computing,

It is mainly used to protect environment, optimize energy consumption and keeps green environment. Green computing also refers to environmentally sustainable computing. Operating System (OS) Optimization is very important for Green computing, because it is bridge for both hardware components and Application Software's. The important Steps for green computing user and energy efficient usage are also discussed in this paper. If public and private sectors takes more interest in green computing, definitely we can save our environment and maintain green environment. Now a day's advanced operating system developers are very much interested towards green computing to attract customer as well as to protect environment by saving power energy.

3] World Academy of Science, Engineering and Technology 63 2012

Green Computing: From Current to Future Trends

Tariq Rahim Soomro and Muhammad Sarwar

Current challenges to achieve Green Computing are enormous and the impact is on computing performance. Efforts of Governments and Non-Government Organizations (NGOs) are also appreciate-able. Government regulations are pushing Vendors to act green; behave green do

green, go green, think green use green and no doubt to reduce energy consumptions as well. All these efforts are still in limited areas and currently efforts are mainly to reduce energy consumption, e-Waste but the future of Green Computing will be depending on efficiency and Green products. Future work in Green Computing discipline will also rely on research work in academics since this is an emerging discipline and there is much more need to be done.

4] Journal of Information Systems and Communication, BATLEGANG B.

ISSN: 0976-8742 & E-ISSN: 0976-8750, Volume 3, Issue 1, 2012, pp.-256-260.

Green Computing: Students, Campus Computing And The Environment- A Case For Botswana

This paper was motivated by the rising cost of energy in Botswana, depletion of natural resources, increasing concern for the environment by the Botho College population. The main aim of this paper was to measure awareness levels of students and staff at Botho College with regards to Green Computing. The research established that the awareness levels are low hence most users are oblivious to energy saving techniques. The research also established that they are no explicit green computing and sustainability policies at the institution.

5] Indian Journal of Current Trends in Management Sciences) Vol. VI. No. 1 ISSN 0976 – 1845 April 2013 Page 94

Sangita Phunde, Supriya Sapa, Madhuri Godbole.

Awareness & Usage of Green Computing amongst Post Graduate Students

Green Computing is the emerging computing technology. It is mainly used to save and protect environment as well as optimize energy consumption and try to keep green environment. In all management students most of them are not aware about green computing. But if we check stream wise then students of IT background education are more aware about green computing. Students gender and usage of online applications are independent, but in stream wise the students of non IT background education make more use of online applications. More awareness about green computing is required to increase among students. The students are aware but does not practically implement at the time of work.

Research Gap: Green Computing is the emerging computing technology. Research on this topic is going on. Mainly research is done on hardware manufacturing and software development to reduce power consumption and e-waste. Very less research is done on user side.

Research methodology

The researcher is interested in finding the awareness and usage of green computing is depended on gender. Data was collected using questionnaire. A questionnaire was designed and issued to 105 students.

I] Objective:

1] To check the awareness of green computing among students with respect to gender.

2] To check the usage of green computing among students with respect to gender.

3] Gender and Knowledge about using screen saver are independent.

4] Gender and online usage o computer are independent.

II] Hypothesis:

1] To test awareness about green computing with respect to gender

H01: Awareness about green computing is independent of Gender

H11: Awareness about green computing is dependent of Gender

2] To test the Knowledge about using screen saver with respect to gender.

H02: Knowledge about using screen saver is independent of gender

H12: Knowledge about using screen saver is dependent of gender

3] To test the knowledge about power consumption with respect to gender

H03: Knowledge about power consumption is independent of gender

H13: Knowledge about power consumption is dependent of gender

III) Types of data:

i) Primary data: Primary data was collected from 105 students using questionnaire.

ii) Secondary data: Website, Internet, Research Magazines, Magazines.

IV) Source of data: Ahmednagar.

V) Research instrument

The questionnaire designed contains closed end questions. The aim of questionnaire was to measure the awareness level and usage of green computing in students for their daily work. In the questionnaire questions were related to awareness and usage of computer system and green computing concept. Power consumption method used while using computer and online usage of computer.

All questions of questionnaire are multiple choice questions with two or five options.

VI) Scope of Study: The scope of study is restricted to Ahmednagar.

VII) Sample Size: 105

VIII) Data Collection Method

To study this population, the data was collected from 105 students of IMSCDR. To study this population, it was divided in 6 strata MCA, MBA, MCM, MBS, MPM and PGDBM. From each strata sample was collected randomly according to proportion in population. Thus stratified random sampling method is used for data collection.

Statistical tools for complete analysis:

For statistical testing researcher used Chi square test because the variables under study are attribute, Z test for testing proportion of students about their awareness. Descriptive statistics such as frequency, relative frequency, mean, mode, proportions and percentage bar graph & pie chart are used whenever required.

Limitations

i) The scope of Green Computing is very large, present paper concentrates only on awareness and usage of green computing during work.

Data Analysis and Findings

Note: 1] The respondents have not marked all the options of questionnaire so the total may not match.

2] Sometimes students may select more than one checkbox.

Q. Are you aware of green computing?

□ Yes □ No

Gender : Female

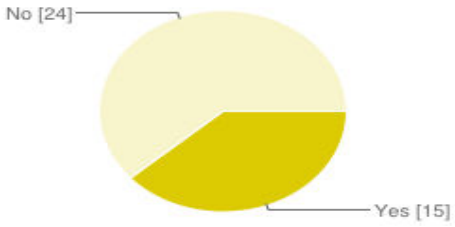


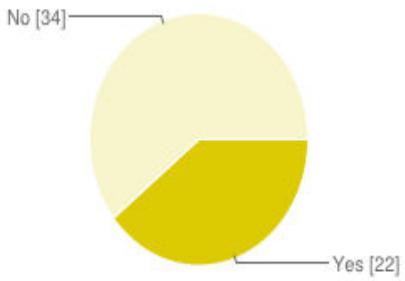
Chart-1

Table-1

Yes	**15**	34%
No	**24**	55%

Gender : Male

Table- 2



Yes	**22**	36%
No	**34**	56%

Chart-2

Testing of Hypothesis:

H01: Awareness about green computing is independent of Gender

H11: Awareness about green computing is dependent of Gender

p1=0.38 p2=0.39

P=0.39 Q=0.61

Z=p1-p2/(√PQ(1/n1+1/n2))

Table-3

Calz	Tab z	conclusion
-0.0983	1.96 at 5% level of significance	Accept Ho

Thus we can say that awareness about green computing is independent of Gender. That is male and female are equally aware about green computing.

Q. Do you use Screen Saver for your monitor?

□ Always □ Frequently □Sometimes □Rarely □Never

Gender: Male

Table -4

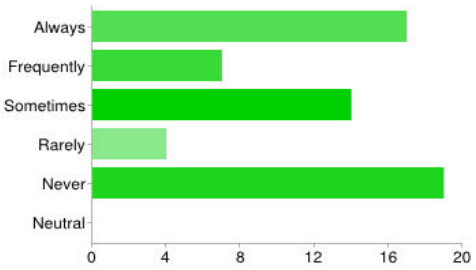


Chart -3

Always	**17**	28%
Frequently	**7**	11%
Sometimes	**14**	23%
Rarely	**4**	7%
Never	**19**	31%
Neutral	**0**	0%

Gender: Female

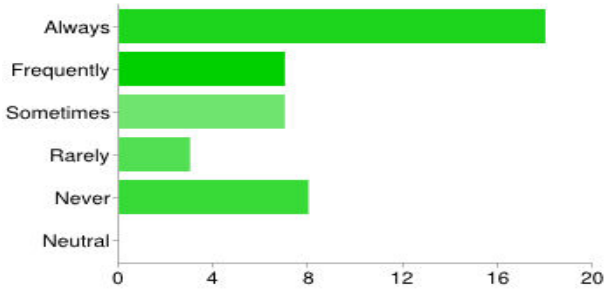


Chart- 4

Table-5

Always	**18**	41%
Frequently	**7**	16%
Sometimes	**7**	16%
Rarely	**3**	7%
Never	**8**	18%
Neutral	**0**	0%

Q. Screen Saver conserves energy when your computer is idle?

□ Disagree strongly □ Disagree □Disagree slightly □Neutral

□Agree slightly □Agree □ Agree Strongly

Gender : Male

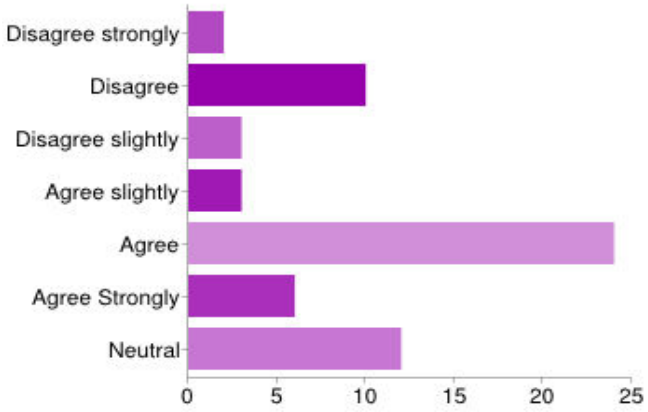


Chart-5

Table-6

Disagree strongly	**2**	3%
Disagree	**10**	16%
Disagree slightly	**3**	5%
Agree slightly	**3**	5%
Agree	**24**	39%
Agree Strongly	**6**	10%
Neutral	**12**	20%

Gender: Female

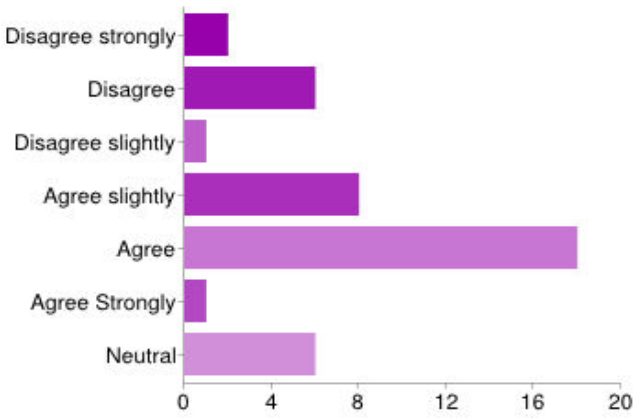


Chart-6

Table-7

Disagree strongly	**2**	5%
Disagree	**6**	14%
Disagree slightly	**1**	2%
Agree slightly	**8**	18%
Agree	**18**	41%
Agree Strongly	**1**	2%
Neutral	**6**	14%

Q. Screen Saver make your computer monitor last longer.

□ Disagree strongly □ Disagree □Disagree slightly □Neutral

□Agree slightly □Agree □ Agree Strongly

Gender: Male

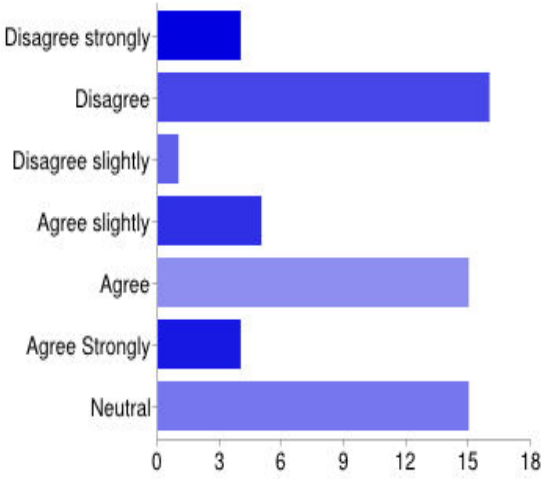


Chart-7

Table-8

Disagree strongly	**4**	7%
Disagree	**16**	26%
Disagree slightly	**1**	2%
Agree slightly	**5**	8%
Agree	**15**	25%
Agree Strongly	**4**	7%
Neutral	**15**	25%

Gender: Female

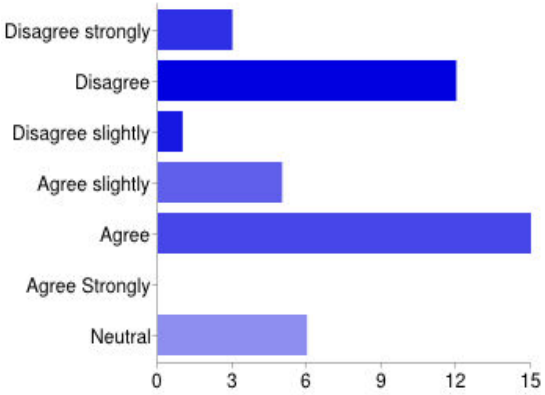


Table-9

Disagree strongly	**3**	7%
Disagree	**12**	27%
Disagree slightly	**1**	2%
Agree slightly	**5**	11%
Agree	**15**	34%
Agree Strongly	**0**	0%
Neutral	**6**	14%

Chart-8

H02: Knowledge about using screen saver is independent of gender

H12: Knowledge about using screen saver is dependent of gender

Table-10

Gender	Knowledge about using screen saver	No Knowledge about using screen saver
male	29	18
female	25	13

Table-11

Cal $\chi 2$	Tab $\chi 2$	Conclusion
0.1515	3.841 at 5% level of significance	Accept Ho

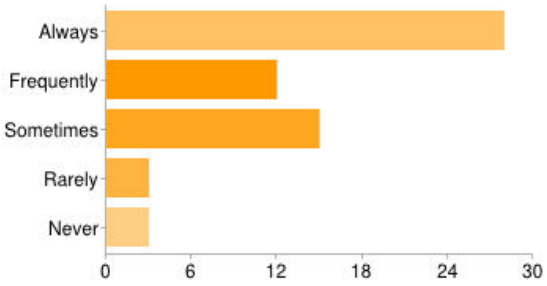
Knowledge about using screen saver is independent of gender. That is male and female are having equal knowledge about screen saver.

Q. Do you switch OFF monitor when you're not using it for short time span (less than 10 minutes)?

□ Always □ Frequently □Sometimes □Rarely □Never

Gender: Male

Table-12

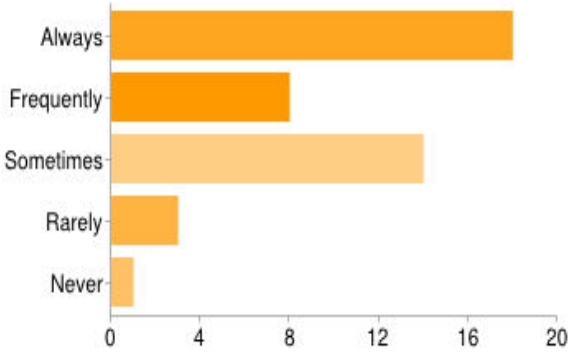


Always	28	46%
Frequently	12	20%
Sometimes	15	25%
Rarely	3	5%
Never	3	5%

Chart -9

Gender: Female

Table-13



Always	18	41%
Frequently	8	18%
Sometimes	14	32%
Rarely	3	7%
Never	1	2%

Chart-10

Q. Do you keep your computer system ON when you're not using it for more than 15 minutes?

□ Always □ Frequently □Sometimes □Rarely □Never

Gender:Male

Table-14

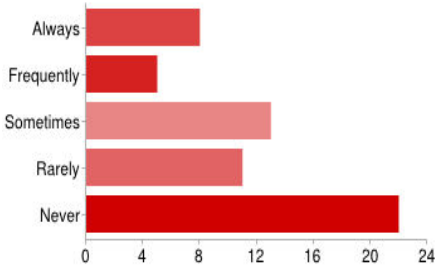


Chart-11

Always	**8**	13%
Frequently	**5**	8%
Sometimes	**13**	21%
Rarely	**11**	18%
Never	**22**	36%

Gender: Female

Table-15

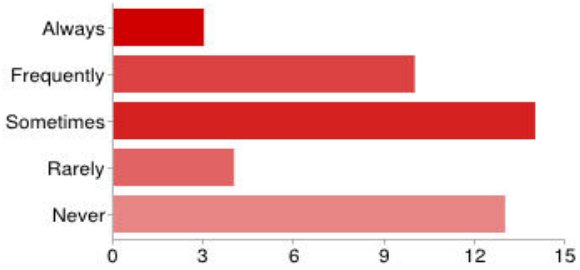


Chart-12

Always	3	7%
Frequently	10	23%
Sometimes	14	32%
Rarely	4	9%
Never	13	30%

Q. Do you think constantly shutting down and restarting your computer during the day would consume more energy than just leaving it running.

□ Disagree strongly □ Disagree □Disagree slightly □Neutral

□Agree slightly □Agree □ Agree Strongly

Gender : Male

Table-16

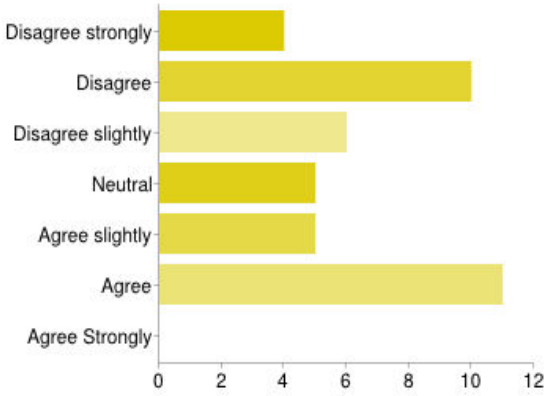
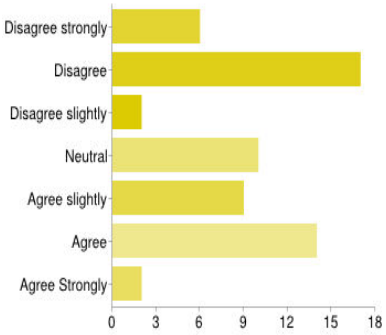


Chart-13

Disagree strongly	4	9%
Disagree	10	23%
Disagree slightly	6	14%
Neutral	5	11%
Agree slightly	5	11%
Agree	11	25%
Agree Strongly	0	0%

Table-17

Gender : Female



Disagree strongly	6	10%
Disagree	17	28%
Disagree slightly	2	3%
Neutral	10	16%
Agree slightly	9	15%
Agree	14	23%
Agree Strongly	2	3%

Chart-14

H03 : Knowledge about power consumption is independent of gender

H13 : Knowledge about power consumption is dependent of gender

Table-18

Gender	Knowledge about power consumption	No Knowledge about power consumption
male	5	39
female	9	52

Table-19

Cal $\chi 2$	Tab $\chi 2$	Conclusion
0.254	3.841 at 5% level of significance	Accept Ho

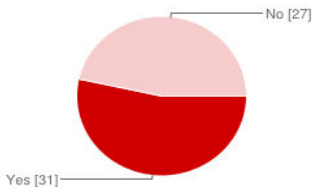
Knowledge about power consumption is independent of gender. That is male and female have equal Knowledge about power consumption while using computer for their work.

Q. Are you aware about the Energy Star Program ?

□ Yes □ No

Gender : Male

Table-20

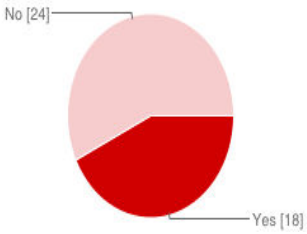


Yes	**31**	51%
No	**27**	44%

Chart-15

Gender : Female

Table-21



Yes	18	41%
No	24	55%

Chart-16

Table-22

	Aware	Not Aware	Total
Male	31	27	58
Female	18	24	42
	49	51	100

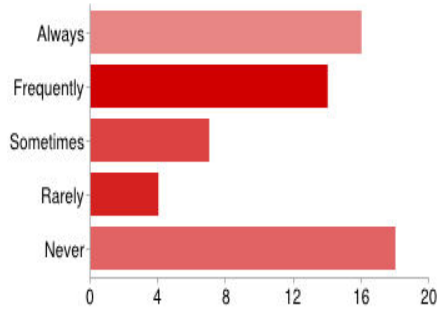
Proportion of male awareness is 0.5344 and proportion of female awareness is 0.4285 so using association of attribute we can say that male are more aware about star energy program.

Q. Do you use online banking wherever possible for paying fees, education loan installment , premiums, mobile bill, electricity bill etc. ?

□ Always □ Frequently □Sometimes □Rarely □Never

Gender: Male

Table-23

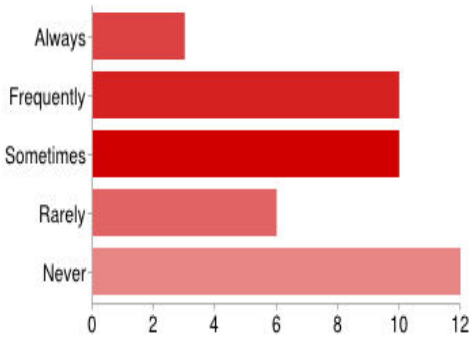


Always	16	26%
Frequently	14	23%
Sometimes	7	11%
Rarely	4	7%
Never	18	30%

Chart-17

Gender: Female

Table-24



Always	**3**	7%
Frequently	**10**	23%
Sometimes	**10**	23%
Rarely	**6**	14%
Never	**12**	27%

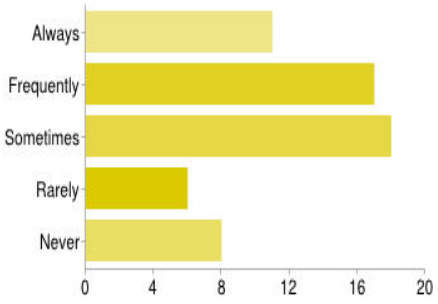
Chart- 18

Q. Do you use online shopping, online airline, train, bus, cinema ticket booking etc wherever possible?

□ Always □ Frequently □Sometimes □Rarely □Never

Table-25

Gender: Male



Always	3	7%
Frequently	8	18%
Sometimes	12	27%
Rarely	4	9%
Never	15	

Chart -19

Gender : Female

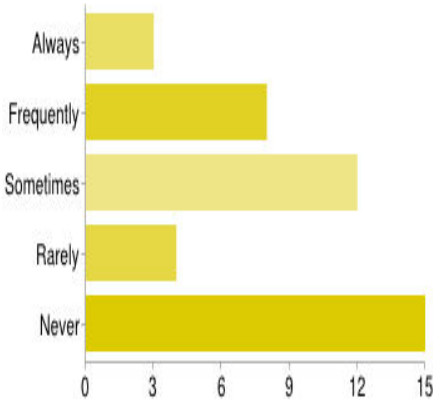


Chart-20

Table-26

	Use Online	Not Use Online
Male	19	29
Female	8	22

Q = ((AB)*(αβ)-(Aβ)*(αB)) / ((AB)*(αβ)+(Aβ)*(αB))

Q= 0.286

Thus we can say that there is positive association between gender and online usage. Thus male make more use of online facility than female.

Conclusion

1. Male and female are equally aware about green computing.
2. Male and female are having equal knowledge about screen saver.
3. Male and female have equal Knowledge about power consumption while using computer for their work.
4. Male are more aware about star energy program than female.
5. Male makes more use of online facility than female.

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