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Awareness On Light Pollution Among Teacher Educators

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Abstract: This article is intended to assess the awareness of light pollution among teacher educators. The data were collected from Teacher educators who are working in teacher education institutions under Tamil Nadu Teacher Education University (TNTEU). The self-made multiple-choice Questionnaire was used to collect the data. Both inferential and descriptive statistics were used to analyse the data. There are many interesting findings were derived. The present study created an insight and enlightened about the light pollution among teacher educators.

Keywords: Awareness, Educators, Light, Pollution, Teacher.

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INTRODUCTION

A growing concern to people, birds, animals, the ecosystem, etc. is light pollution. Around 80% of the world's population, according to the International Dark Sky Association (2016), reside under skyglow. "People all around the world are living under the nighttime glare of ambient light, and it is producing enormous difficulties for people, nature, and the environment," according to the National Geographic association USA. Consequences result from excessive light pollution: It competes with scientific study, affects ecosystems, is harmful to human health, wastes energy, and obscures the stars in the night sky (Globe at Night, 2022). "Light pollution may not seem to be as destructive to public health and welfare as contamination of water resources or the atmosphere, but it is an environmental quality issue of no little concern," according to Nathanson (2020). In the modern world, excessive light pollution blurs and obscures the vision of the universe, increases energy usage significantly, interferes with astronomical study, makes noise, disrupts ecosystems, and harms both human and animal health.

Definition of Light Pollution

The presence of manmade artificial light in normally dark environments is known as light pollution. Another way to define light pollution is as unwelcome or excessive artificial light. Light pollution, as per Globe at Night (2022), is abundant, improperly focused, or intrusive synthetic (often external) light. Future Energy Conservation (2022) Light pollution is the result of abundant, unsuitable, or poorly focused outdoor illumination. In addition to obscuring the view of the universe and increasing energy consumption, excessive light pollution also interferes with astronomical study, destroys ecosystems, and jeopardizes the health and safety of both people and animals. Indoor and outdoor light pollution are other categories of light pollution. Indoor light pollution can cause problems for people, and outdoor light pollution harms the ecology in various ways. According to the International Dark-Sky Association, "any undesirable effect of artificial light, including sky glow, glare, light trespass, light clutter, diminished visibility at night, and energy waste" is considered to be light pollution. In general the light pollution can be classified as follows

- Glare – excessive brightness that causes visual discomfort
- Sky glow – brightening of the night sky over inhabited areas
- Light trespass – light falling where it is not intended or needed
- Clutter – bright, confusing and excessive groupings of light sources.

Statement of The Problem

Any inventions have opportunities for positive as well as negative impacts. The invention of electricity is made catastrophic changes in the human lifestyle and behavior. From the late 19th century gradually increased availability and accessibility of electricity and during the 21st century, power consumption reached the javelin stage. As a result, lighting alone represents 19% of the world's total electricity consumption (Global Smart Cities, 2022). Due to lack of awareness of the effective utilization of electricity for lighting purposes, lack of updated lighting technologies, poor awareness of the impact of light pollution, etc., are the major cause of light pollution. Educating and disseminating about light pollution among the young generation is inevitable. The teacher and teacher educator should aware of light pollution and take responsibility to disseminate the knowledge among school students. Hence the researcher indented to explore to what extent the teacher educator is aware of light pollution and its consequences.

Need and Significance of Study

The present study is addressing one of the emerging modern environmental issues of light pollution. Prevention of light pollution is very important because it protects not only human health but environmental health also. Prevention the light pollution can protect the ecosystem which includes birds and animals. The present study is the need of the hour to explore to what extent the teacher educator is aware of light pollution and the present study creates insight into light pollution and its consequences among teacher educators.

Objectives of The Study

The following objectives of were formulated for the present study

To find out the level of awareness about light pollution among teacher educators.

- To find out the percentage of awareness about various aspects of light pollution among teacher educators.
- To find out the significant mean score difference between categorical variables such as Gender (Male & Female), Residential locality (Rural & Urban), Educational Qualification (PG+NET/SLET & P.HD), Faculty (Arts & Science), and Programmes (Attended & Not attended).
- To find out the significant mean score difference among Years of Teaching Experience (<5 Years, 5 to 10 Years & >10 Years)?

Hypothesis of The Study

Based on the above objectives the null hypotheses were formulated to test.

MATERIALS AND METHODS

In the present study, the researcher constructed a self-made multiple-choice questionnaire was used. 18 suggested questions were selected from International Dark-Sky Association (IDSA) and Globe at Night website. The questions are True or false type and a few questions are having multiple choice. Each question carries one mark. Hence the maximum mark is eighteen and the minimum mark is zero.

Population, Sample and Collection of Data

The teacher educators who are working in teacher Education institutions under Tamil Nadu Teacher Education University (TNTEU) are considered as population. 126 samples were collected by adopting a simple online random sampling method. The question was created in Google form and distributed through the WhatsApp group. The researcher requested the volunteer to complete the Google form and ensured them that the collected data will be used for only research purposes.

Statistical Analysis

The collected data were analyzed by using descriptive and inferential statistical analysis.

Delimitation of The Study

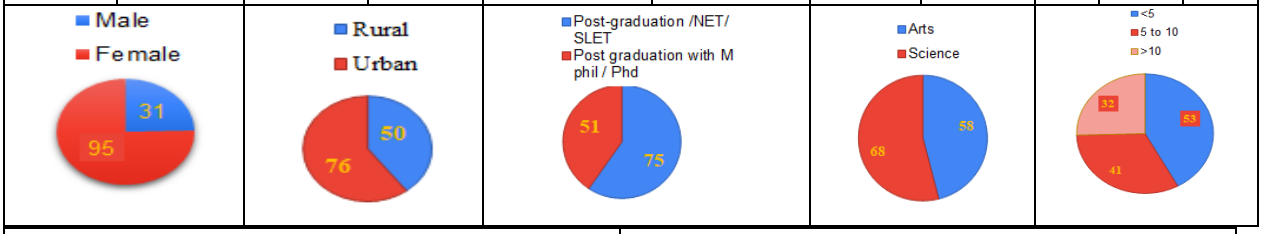
The present study concentrated only on light pollution and the sample was delimited to the teacher educators who are working in teacher education institutions in Tamil Nadu under Tamil Nadu Teacher Education University (TNTEU).

ANALYSIS AND INTERPRETATION OF THE DATA

The data were collected from 126 sample of teacher educator following analysed and interpretation were derived.

TABLE 1. *Distribution of Samples*

Gender		Locality		Educational Qualification		Faculty		Experience In Years		
Male	Female	Rural	Urban	Post-Graduation /NET/ SLET	Post-Graduation with M Phil / PhD	Arts	Science	<5	5 to 10	>10
31	95	50	76	75	51	58	68	53	41	32



Attended Seminar/ Conference Related to Environmental pollution		Awareness about International Dark sky Association	
Attended	Not Attended	Aware	Not Aware
65	61	61	65

The data were collected from teacher educators by adopting Volunteer sampling is a sampling technique where participants self-select to become part of a study because they volunteer when asked, or respond to an advert. Hence the researcher able to received 126 responses from volunteers which are includes Gender (Male =31 & Female= 95), Locality (Rural=50 & Urban=76), Educational Qualification (PG /NET/ SLET =75 & M Phil / PhD =51), Faculty (Arts =58 & Science =68), Experience in years (<5 =53, 5 to 10 =41 & >10 =32) and Seminar/ Conference related (Attended =65 & Not Attended =61). Among the 126 samples, only 61 are aware of the International Dark SKY Association and the other 65 respondents are not aware. The obtained mean score (12.77) is greater than the mid value (9); hence the awareness of teacher educators on light pollution is above average. The Table no-3 reveals the percentage of Awareness about Various aspects of Light Pollution among Teacher Educators. 95.2 % (N=120) of respondents accepted that the excess of light is also pollution and the remaining 4.8 % (N=6) are not accepting that the excess of light is not at all pollution. Hence they need to educate about the consequences of light pollution.

Only 41.3 % of respondents are able to define the meaning of light pollution. 81.7 % (N=103) are aware that light pollution can cause sleeping disorders and the remaining 18.3 % (N=23) are not aware that light pollution causes sleeping disorders. Hence, they need to be educated about the issues of light pollution with sleeping disorders.

84.1 % (N=106) are aware that Light pollution disrupts the circadian rhythms, 81 % (N=102) of respondents are aware that Melatonin is associated with light pollution, 93.7 % (N=118) accepted that light pollution is harming human health, only 27.8 % (N=35) are aware of that the sky glow is not associated with temporary blindness, 82.5 % (N=104) teacher educators are aware of that the light pollution causes significant harm to nature and 92.1 % (N=116) teacher educators accepting that the Natural darkness is important to a healthy ecosystem.

81.7 % (N=103) and 70.6 % (N=89) of respondents are aware about wild animals and sea turtles are affected by light pollution, 88.9 % (N=112) are having consciousness towards that people are suffering from excess artificial light in urban areas, 83.3 % (N=105) of teacher educators are accepted that the outdoor commercial lights are also a disturbance, 73.0 % (N=92) of teacher educators are accepted that the no need of Decorative lights, only 61.1 % (N=77) of respondents are always avoiding the unnecessary use of lights and 34.9 % (N=44) of respondents are sometimes they avoiding the unnecessary use of lights.

Only 48.4 % (N=61) of teacher educators are aware of the International Dark Sky Association and 42.1 % (N=53) of respondents are aware that 80 % of the world population is affected by sky glow.

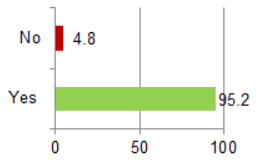
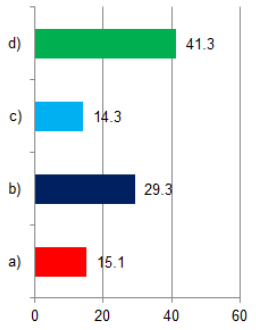
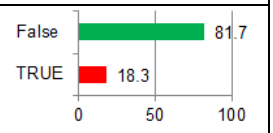
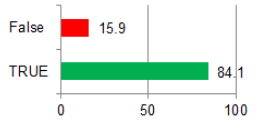
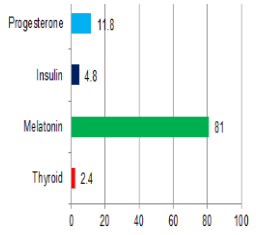
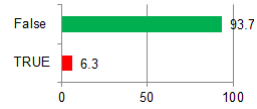
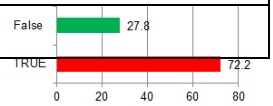
Ho1. There is no significant mean score difference in awareness of teacher educators on Light pollution with respect to categorical variables such as a). Gender (Male & Female), b). Residential locality (Rural & Urban), c). Educational Qualification (PG+NET/SLET & P.HD), d). Faculty (Arts & Science) and e). Programme (Attended & Not attended).

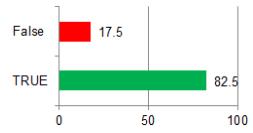
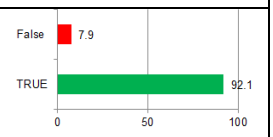
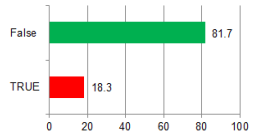
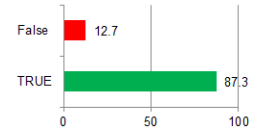
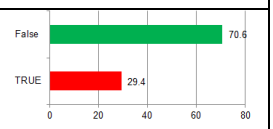
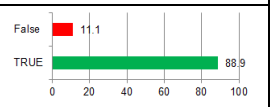
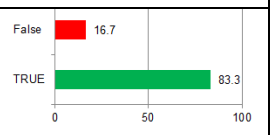
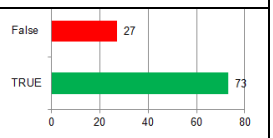
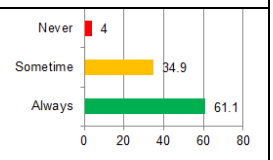
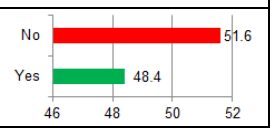
Table 4 reveals the Mean score difference in awareness of teacher educator on Light pollution with respect to categorical variables such as a). Gender (Male & Female), b). Residential locality (Rural & Urban), c). Educational Qualification (PG+NET/SLET & P.HD), d). Faculty (Arts & Science) and e). Programme (Attended & Not attended).

TABLE 2. *Awareness about Light Pollution among Teacher Educator*

Number of Samples	Maximum Score	Minimum Score	Mean Score	Standard Deviation (SD)	Mid Value	Result
126	17	7	12.77	1.8	9	Above Average

TABLE 3. *Percentage of Awareness about Various aspect of Light Pollution among Teacher Educators*

Q.N	Questions	Response	Frequency	%	Diagrammatic Representation of %
1	Do you accept that the excess of light is also pollution?	Yes	120	95.2	
		No	6	4.8	
2	What is light pollution?	a). Light bulbs that are not properly disposed	19	15.1	
		b). Bright lights on motor vehicles	37	29.3	
		c). Outdoor lights that are left on all day	18	14.3	
		d). Excessive artificial light in the night sky	52	41.3	
3.(Negative Question)	Light pollution cannot cause sleeping disorders.	True	23	18.3	
		False	103	81.7	
4	Light pollution disrupts the circadian rhythms.	True	106	84.1	
		False	20	15.9	
5	Which one of the following is associated with light pollution?	Thyroid	3	2.4	
		Melatonin	102	81.0	
		Insulin	6	4.8	
		Progesterone	15	11.8	
6 Negative Question	Light pollution does not harms human health	True	8	6.3	
		False	118	93.7	
7	Too much of the sky glow causes	True	91	72.2	

	temporary blindness.	False	35	27.8	
8	Light pollution causes significant harm to nature	True	104	82.5	
		False	22	17.5	
9	Natural darkness is important to healthy ecosystem	True	116	92.1	
		False	10	7.9	
10. (Negative Question)	Animals did not affect by light pollution	True	23	18.3	
		False	103	81.7	
11	Does light pollution affect the behaviour of migratory birds?	True	110	87.3	
		False	16	12.7	
12. (Negative Question)	Sea turtles are not affected by light pollution.	True	37	29.4	
		False	89	70.6	
13	People are suffering from excessive artificial light in urban areas.	True	112	88.9	
		False	14	11.1	
14	Outdoor commercial lights are also a disturbance.	True	105	83.3	
		False	21	16.7	
15	No need of Decorative lights.	True	92	73.0	
		False	34	27.0	
16	I avoid the unnecessary use of lights.	Always	77	61.1	
		Sometime	44	34.9	
		Never	5	4.0	
17	Did you aware of International Dark Sky Association?	Yes	61	48.4	
		No	65	51.6	

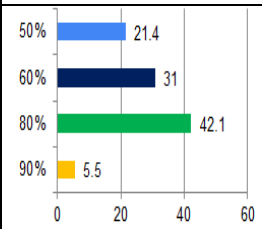
18	According to the International Dark-Sky Association, how much of the world population is affected by sky glow?	90%	7	5.5	
		80%	53	42.1	
		60%	39	31.0	
		50%	27	21.4	

TABLE 4. *Mean score difference in awareness of teacher educator on Light pollution*

Categorical Variables		N	Mean	SD	't'	'P' Value Sig	Results S/NS
a). Gender	Male	31	12.45	1.92	1.12	0.26	NS
	Female	95	12.87	1.78			
b). Residential locality	Rural	50	12.82	1.74	0.25	0.80	NS
	Urban	76	12.74	1.87			
c). Educational Qualification	PG+NET/SLET	75	12.87	1.75	0.72	0.47	NS
	Doctorate (Ph.D)	51	12.63	1.91			
d). Faculty	Arts	58	12.72	1.73	0.25	0.79	NS
	Science	68	12.81	1.90			
e). Programmes	Attended	65	13.15	1.50	2.49	0.01	S
	Not Attended	61	12.36	2.04			

Table 4 reveals the calculated 't' value of a). Gender (1.12), b). Residential locality (0.25), c). Educational Qualification (0.72) and d). Faculty (0.25) is less than the table value (1.96). Hence the formulated hypothesis Ho1 (a, b.c & d) is accepted that there is no significant means score difference in awareness of teacher educators on light pollution with respect to a). Gender, b). Residential locality, c). Educational Qualification & d). Faculty. However, the calculated to the value of e). Programme attended and not attended (2.49) is greater than the table value (1.96). Hence the formulated null hypothesis of Ho1(e) is rejected at the 0.05% level and accepted as the alternate

hypothesis. While comparing the mean score the teacher educator who attended the seminar or conference (13.15) related to environmental pollution is better than the teacher educator who is not attended any seminar or conference (12.36) related to environmental pollution.

Ho2. There is no significant mean score difference among Years of Teaching Experience a). (<5 Years, b). 5 to 10 Years & c). >10 Years) and awareness of light pollution.

The ANOVA table no: 5 reveals that the calculated 'p' (0.03) value is less than the table value (0.05). Hence the formulated null hypothesis is rejected and accepted the alternate hypothesis. Followed by table 6 the LSD Post hoc test reveals that the teacher educator who have >10 Years of teacher r experience than the teacher-educator who have <5 Years and 5 to 10 Years of teaching experience.

IMPORTANT FINDINGS

- The teacher educators are having an above-average level of awareness about light pollution.
- The levels of awareness level do not differ based on Gender. Residential

locality, Educational qualifications, and faculty.

- The teacher educator who attended seminars/conferences related to environmental pollution are having a better awareness of light pollution than those who are not attended seminars/conferences related to environmental pollution.
- The teacher educator who has more than ten years of teaching experience is better in awareness of light pollution than those with less teaching experience.

TABLE 5. *Significant mean score difference among Years of Teaching Experience a). (<5 Years, b). 5 to 10 Years &c). >10 Years) and awareness of light pollution*

ANOVA					
Groups	Sum of Squares	df	Mean Square	F	Sig. 'p'
Between Groups	22.061	2	11.031	3.459	0.03
Within Groups	392.264	123	3.189		

TABLE 6. *Post hoc - Least Significant Difference test (LSD)*

Mean score (Variable)			Mean Difference	Sig ('p' values)	S/NS
a). <5 Years	b). 5 to 10 Years	c). >10 Years			
12.70	12.34		0.35	0.33	NS
	12.34	13.44	1.09	0.01*	S
12.70		13.44	0.73	0.06	NS

EDUCATIONAL IMPLICATION

- Advanced environmental education should be made a compulsory subject in all undergraduate teacher education courses.
- Environmental pollution-related in-service programmes should be provided to the teacher educator.
- Frequent seminar conferences, seminars, workshops, etc., should be conducted for both student teachers and teacher educators.
- Frequent advertisements and public awareness programme should be provided to make more attention to 21st-century pollution such as radiation pollution and light pollution.

CONCLUSION

There are no hundred present positive inventions. Any research and development have its positive as well as negative impact on humans, animals, the environment, and the eco-system. In the past two centuries along with the modern scientific and industrial development, there are new forms of pollution and environment-related issues emerge. It needs of the hour to educate the people about the negative impact of various scientific inventions. Lighting technology is one of the holly inventions in human history. But it is very unfortunate that due to poor awareness, ignorance, and fantasy about lighting lead the light becomes pollution. The present study derived a few interesting findings and made attempt creates enlightenment and insights among teacher educator. The present study made an attempt to disseminate awareness about light pollution the school students through student teachers through teacher educators.

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