



Received:

2025/03/10

Accepted:

2025/07/05

Published:

2025/07/22

## RESEARCH PAPER

## OPEN ACCESS

# Building Green Awareness and Practices among Urban School Students through Interventions Based on Behaviour Change Model

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## Abstract

Green awareness pertains to the extent to which individuals are aware about the environmental issues, green things and green practices. For the present study, green practices include information seeking practice of individuals from various sources and whispering it to others. It involves sharing knowledge about green practices and convincing others to perform these practices. The action-based experimental research study was conducted in Ludhiana district of Punjab consisting of three government senior secondary schools from the urban area. Two of the schools served as experimental groups while the third acted as control group. A total of 150 students, 50 from each school were selected randomly. The primary objective of the study is to enhance awareness, green seeking and green whispering practices among the students followed by intervention. The pre-collected data indicated limited awareness, information seeking and whispering practices related to green among both control and experimental group. To address this intervention was developed for the experimental group based on Fogg behavior model which includes three components for behavior change i.e. ability, motivation and prompt/trigger. Following the intervention, the results showed a significant increase in awareness, information seeking and whispering practices in experimental group students with a mean score improved from  $\bar{x} = 2.69$  to  $\bar{x} = 3.67$  for information seeking and  $\bar{x} = 1.04$  to  $\bar{x} = 1.97$ , for green whispering practices. It indicates that the intervention was effective in changing the behaviour and promoting practices that foster green behaviour.

**Keywords:** Green seeking; Green whispering; Motivation; Ability; Prompt; Behavior

## Introduction

Our planet is continuously facing environmental degradation because of unethical human actions, which includes deforestation, unnecessary use of plastic, excessive greenhouse gas emissions, industrial and agricultural waste, overuse of pesticides, water and energy wastage, excessive construction etc. these localized issues contribute to broader global challenges like global warming which is leading to extreme weather conditions like flood, drought, heat waves etc. The current rapid growth in the economy is also identified as a primary driver of environmental degradation (Shamsi and Siddiqui, 2017). After the liberalisation, privatization and globalization (LPG) reforms, India opened-up to global capitalism and trade in the 1990s, resulting in increased purchasing power and consumerism which lead to exponential growth in unsustainable practices.

Studies uncover that environmental issues are ranked as top challenge followed by economy, healthcare, unemployment and lastly crime. (Paetz et al., 2012; Dagher and Itani, 2014; Acheampong et al., 2023). Along with issues like terrorism and economic breakdown, citizens and policy makers around the world are now focusing on environmental problems as major concern to be addressed (Nath et al., 2012). Despite of being a top challenge and a major concern, many



nations are still not addressing it as a priority. Even in India, although environmental concern is significant but often rank below the issues like economy, health and unemployment challenges.

Amidst of escalating environmental challenges, there is a necessary to adopt sustainable solutions to harmonize the consumption and production patterns of individuals. To achieve this, individuals first need to be aware about these environmental issues and understand them how to solve them at personal level. They should know about the various sources from where they can seek information and to whom they can share the information and convince others to follow a green practice after becoming sensitized themselves. For the current study, school students from ninth to twelfth standard were selected as a respondent as at this age students are more receptive to ideas and practices. Raising awareness or encouraging them to follow a practice, are likely to embrace these changes, often turning them into lifelong habits. With this in mind intervention-based study was conducted with the following objectives:

- To study the existing awareness, green information seeking, and green whispering practices among students.
- To evaluate the improvement in awareness, green information seeking, and green whispering practices among students following the intervention.

### Methodology

The present study was carried out in Ludhiana District of Punjab, where three urban zones were selected randomly. From each of these zones, one government senior secondary school was selected resulting in a total of three schools. Out of these, two schools were taken as experimental group while remaining third school as a control group. 50 students were selected from each school, bringing the total of 150 school students. From all the selected schools, initial data was gathered through survey method by using structured interview-schedule. The responses of respondents for existing awareness were taken as 'yes or no' and for green practices responses were obtained for each statement on a five-point continuum Likert scale i.e. Always (5), Often (4), Sometimes (3), Rarely (2), and Never (1). Following this, an intervention was designed for the experimental group which included lecture-cum discussions, motivational videos, storytelling, demonstrations related to green practices, quiz competitions and best out of waste competition were also organized. Additionally, WhatsApp group was created to continuously inform the students regarding green practices. After the gap of four months post data was collected from all the selected groups. The analysis of Data was performed using various statistical tools including frequencies, percentages, category interval method, mean score, correlation, paired 't' test and independent 't' test.

### Results and discussion

**Table 1.** Distribution of respondents according to their change in awareness about green practices (N=150)

Awareness about	Before intervention		After intervention	
	Control group (n=50)	Experimental group (n=100)	Control group (n=50)	Experimental group (n=100)
	f(%)	f(%)	f(%)	f(%)
The term 'green/eco-friendly consumption'	12 (24.0)	17(17.0)	18 (36.0)	100 (100)
Green/eco-friendly consumption practices	12 (24.0)	17 (17.0)	12 (24.0)	100(100)
Benefits of green/eco-friendly consumption	12 (24.0)	17 (17.0)	12 (24.0)	98(98.0)
The concept of global warming	45 (90.0)	95 (95.0)	47 (94.0)	94(94.0)
The concept of climate change	39 (78.0)	89 (89.0)	39 (78.0)	98(98.0)
The link between green/ eco-friendly consumption and global warming	4 (8.0)	12 (12.0)	4 (8.0)	92(92.0)
The link between green/ eco-friendly consumption and climate change	4 (8.0)	12 (12.0)	4 (8.0)	92(92.0)
Eco-labelling	0 (0.0)	0 (0.0)	0 (0.0)	54(54.0)
Total mean percentage	32.0	32.3	34.0	91.0

### Awareness regarding green practices

The findings from the table 1 reveals that the awareness of respondents in both control and experimental groups regarding environmental issues and related green consumption practices were low. After the intervention, the experimental group attained full awareness about the term green consumption, its practices, benefits, along with strong understanding of their links to the global warming and climate change. Respondents were previously unfamiliar about ecolabelling, after the intervention half of the majority i.e. 54% of the respondents were fully aware about the ecolabels. In contrast, the control group showed slight improvements as they did not receive any

interventions. The overall percent of respondents with gained awareness in the experimental group increased significantly from 31 % to 91% highlighting the effectiveness of the intervention in raising green awareness.

**Table 2.** Change in green information seeking of respondents from close contact (N=150)

Information seeking from		Groups		t' value
		Control (n=50)	Experimental (n=100)	
Close contact		Mean score $\pm$ SD	Mean score $\pm$ SD	
Friends	Before intervention	1.14 $\pm 0.35$	1.00 $\pm 0.0$	4.008**
	After Intervention	1.18 $\pm 0.43$	2.68 $\pm 1.11$	9.131**
	Paired t' value	1.429	15.026**	
Family	Before intervention	1.14 $\pm 0.35$	1.00 $\pm 0.0$	4.008**
	After Intervention	1.18 $\pm 0.38$	1.98 $\pm 0.90$	5.945**
	Paired t' value	1.429	10.771**	
Neighbors	Before intervention	1.02 $\pm 0.14$	1.00 $\pm 0.0$	1.419
	After Intervention	1.02 $\pm 0.14$	1.24 $\pm 0.55$	2.766**
	Paired t' value	-	4.342**	

\* p < 0.05 but > 0.01 ; \*\* p < 0.01; (Mean range: 1-5)

### Green information seeking

Change in green information seeking consists of information seeking from various sources like close contact, school, media, social media and government sources and about various things like green products, food items, labels/marks, practices/activities and the product price.

### Close contact as source of information

Close contact sources include friends, family, and neighbours. The findings from the table 2 reveals that information seeking practices from close contacts has significantly improved in the experimental group after intervention with the t value of 15.026 for friends, t=10.771 for family, t=4.342 for neighbours at one per cent level of significance for each of the sources. While control group non-significant and no changes at post-test stage as no intervention was applied to them. These findings underscore the effectiveness of the interventions in enhancing information seeking practices from close contacts in the experimental group.

**Table 3.** Change in green information seeking of respondents from school (N=150)

Information seeking from		Groups		t' value
		Control (n=50)	Experimental (n=100)	
School		Mean score $\pm$ SD	Mean score $\pm$ SD	
Teacher	Before intervention	2.94 $\pm 1.09$	4.18 $\pm 1.0$	6.894**
	After Intervention	2.96 $\pm 1.08$	4.72 $\pm 0.45$	13.990**
	Paired t' value	1.0	4.848**	
School programme	Before intervention	3.82 $\pm 0.87$	3.00 $\pm 0.66$	6.384**
	After Intervention	3.84 $\pm 0.80$	4.67 $\pm 0.49$	7.609**
	Paired t' value	1.0	19.046**	
School project/assignment	Before intervention	3.72 $\pm 0.88$	3.91 $\pm 1.0$	1.160
	After Intervention	3.74 $\pm 0.82$	4.65 $\pm 0.50$	8.366**
	Paired t' value	1.0	6.579**	
Exhibition/workshop	Before intervention	3.16 $\pm 0.95$	3.47 $\pm 1.20$	1.616
	After Intervention	3.16 $\pm 0.95$	4.44 $\pm 0.52$	10.643**
	Paired t' value	-	7.470**	
School clubs	Before intervention	2.72 $\pm 0.94$	2.07 $\pm 1.30$	3.117**
	After Intervention	2.72 $\pm 0.94$	4.30 $\pm 0.48$	13.550**
	Paired t' value	-	15.860**	

\* p < 0.05 but > 0.01 ; \*\* p < 0.01; (Mean range: 1-5)

### School as source of information

School sources include teacher, school programme, school project/assignment, exhibition/workshop and school clubs. The results from the table 3 reveals that information seeking practices from various school sources has significantly improved in the experimental group after intervention. The t value was 4.848 for teachers,  $t=19.046$  for school programme,  $t=6.579$  for school project/assignment,  $t=7.470$  for exhibition/workshop and  $t=15.860$  for school clubs all significant at 1% level. In contrast, the control group showed no significant changes at post-test stage as no intervention was given to them. These findings highlight the effectiveness of the interventions in enhancing information seeking practices through school sources in the experimental group.

**Table 4.** Change in green information seeking of respondents from media (N=150)

Information seeking from		Groups		t' value
		Control (n=50)	Experimental (n=100)	
Media		Mean score $\pm$ SD	Mean score $\pm$ SD	
Television	Before intervention	3.38 $\pm 1.00$	3.72 $\pm 1.10$	1.832
	After Intervention	3.38 $\pm 1.00$	4.31 $\pm 0.50$	7.534**
	Paired t' value	-	4.889**	
Radio/FM	Before intervention	1.00 $\pm 0$	1.17 $\pm 0.80$	1.594
	After Intervention	1.00 $\pm 0$	1.17 $\pm 0.80$	1.594
	Paired t' value	-	-	
Literature/books	Before intervention	3.32 $\pm 0.89$	3.51 $\pm 1.00$	1.145
	After Intervention	3.32 $\pm 0.89$	4.15 $\pm 0.48$	7.426**
	Paired t' value	-	5.521**	
Newspaper	Before intervention	3.20 $\pm 0.98$	3.50 $\pm 1.2$	1.575
	After Intervention	3.20 $\pm 0.98$	4.15 $\pm 0.49$	7.779**
	Paired t' value	-	5.018**	

\*  $p < 0.05$  but  $> 0.01$ ; \*\*  $p < 0.01$ ; (Mean range: 1-5)

### Media as source of information

Media sources comprised of television, radio/FM, literature/books and newspaper. The results from the table 4 reveals notable improvement in information seeking practices among the experimental group following the intervention. The t value was 4.889 for television,  $t=5.521$  for literature/books and  $t=5.018$  for newspaper all significant at 1% level. Interestingly, no changes were observed in case of information seeking from radio/FM which was already low even before the intervention. However, the control group showed no changes at post-test stage since they did not receive any intervention. The findings highlight the effectiveness of the interventions in boosting information seeking practices through various media sources within the experimental group.

**Table 5.** Change in green information seeking of respondents from social media (N=150)

Information seeking from		Groups		t' value
		Control (n=50)	Experimental (n=100)	
Social media		Mean score $\pm$ SD	Mean score $\pm$ SD	
WhatsApp	Before intervention	3.00 $\pm 0.0$	3.64 $\pm 1.1$	3.988**
	After Intervention	3.04 $\pm 0.19$	4.69 $\pm 0.49$	23.036**
	Paired t' value	1.429	8.684**	
Instagram	Before intervention	3.52 $\pm 0.95$	3.24 $\pm 1.30$	1.318
	After Intervention	3.52 $\pm 0.95$	4.40 $\pm 0.55$	7.234**
	Paired t' value	-	8.443**	
Facebook	Before intervention	1.60 $\pm 0.49$	2.71 $\pm 0.90$	8.120**
	After Intervention	1.60 $\pm 0.49$	2.77 $\pm 0.81$	9.322**
	Paired t' value	-	2.514*	
You tube	Before intervention	2.86 $\pm 1.12$	3.00 $\pm 1.30$	0.635
	After Intervention	2.90 $\pm 1.14$	4.46 $\pm 0.60$	10.884**
	Paired t' value	1.429	10.200**	

\*  $p < 0.05$  but  $> 0.01$ ; \*\*  $p < 0.01$ ; (Mean range: 1-5)

### Social media as a source of information

Social media platforms such as WhatsApp, Instagram, Facebook and YouTube play an important role in providing information. According to the data displayed in Table 5 there has been a significant enhancement in information seeking practices among the experimental group after intervention. The t value indicates strong improvement which was 8.684 (1% level) for WhatsApp,  $t=8.443$  (1%level) for Instagram,  $t= 2.524$  (5%level) for Facebook and  $t= 10.200$  (1% level) for YouTube. In contrast, the control group showed no changes during the post-test stage as no intervention was applied to them. These findings demonstrate the effectiveness of the interventions by showing improvement in information seeking practices among the experimental group through social media sources.

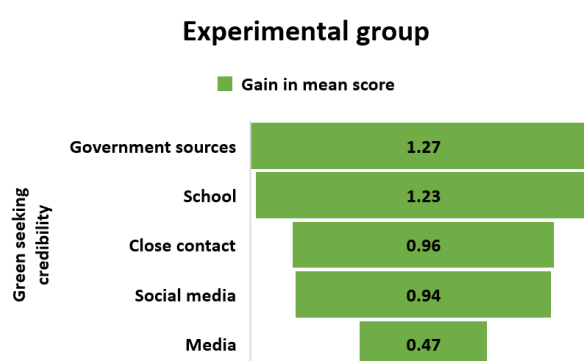
**Table 6.** Change in green information seeking of respondents from government (N=150)

Information seeking from		Groups		t' value
		Control (n=50)	Experimental (n=100)	
Government sources		Mean score $\pm$ SD	Mean score $\pm$ SD	
Hoarding / Banners	Before intervention	3.40 $\pm 0.83$	3.55 $\pm 1.00$	0.894
	After Intervention	3.42 $\pm 0.78$	4.20 $\pm 0.53$	6.948**
	Paired 't' value	1.0	5.531**	
Municipality activities	Before intervention	1.64 $\pm 0.75$	2.28 $\pm 0.80$	4.747**
	After Intervention	1.64 $\pm 0.75$	4.30 $\pm 0.52$	25.817**
	Paired 't' value	-	20.959**	
Social advertisement	Before intervention	3.12 $\pm 0.72$	3.35 $\pm 1.0$	1.475
	After Intervention	3.12 $\pm 0.72$	4.50 $\pm 0.54$	12.794**
	Paired 't' value	-	9.548**	

\*  $p < 0.05$  but  $> 0.01$ ; \*\*  $p < 0.01$ ; (Mean range: 1-5)

### Government as source of information

Government sources including Hoardings/banners, municipality activities and social advertisement. Table 6 reveals that information seeking practices from various government sources has significantly improved in the experimental group after intervention. The t value was 5.531 (1% level) for Hoardings/banners,  $t=20.959$  (1% level) for Municipality activities and  $t= 9.548$  (1%level) for social advertisement. However, the control group did not show changes at post-test stage as no intervention was applied. These results clearly illustrate the effectiveness of the interventions in enhancing information seeking practices through government sources in the experimental group.



**Fig. 1.** Change in mean score of respondents regarding green information seeking after intervention

### Green whispering

Green whispering is to whom individuals are sharing information regarding green practices and to whom they are convincing to buy green products and to perform green practices (Perera et al; 2016).

### Change in green whispering

Green whispering including Friends, family, teachers, relatives and neighbours. Table 6 reveals that green whispering practices to various circle has significantly improved in the experimental group after intervention. The t value was 21.976 (1% level) for friends,  $t=10.142$  (1% level) for family members,  $t= 13.634$  for teachers,  $t= 6.828$  for relatives and  $t= 5.461$  (1%level) for neighbours.

Despite this, amongst all the social group, students showed highest improvement in green whispering to and with 'friends'.

**Table 7.** Overall change in green information seeking of respondents (N=150)

Information seeking from		Groups		t' value	Ranking for experimental group
		Control (n=50)	Experimental (n=100)		
		Mean score $\pm$ SD	Mean score $\pm$ SD		
Close contact	Before intervention	1.10 $\pm$ 0.24	1.00 $\pm$ 0.00	4.232**	III
	After Intervention	1.13 $\pm$ 0.28	1.96 $\pm$ 0.52	10.559**	
	Paired 't' value	1.429	18.787**		
School	Before intervention	3.27 $\pm$ 0.49	3.32 $\pm$ 0.02	0.607	II
	After Intervention	3.28 $\pm$ 0.48	4.55 $\pm$ 0.32	18.956**	
	Paired 't' value	1.769	19.742**		
Media	Before intervention	2.72 $\pm$ 0.45	2.97 $\pm$ 0.64	2.445*	V
	After Intervention	2.72 $\pm$ 0.45	3.44 $\pm$ 0.372	10.311**	
	Paired 't' value	-	6.928**		
Social media	Before intervention	2.74 $\pm$ 0.42	3.14 $\pm$ 0.73	3.574**	IV
	After Intervention	2.76 $\pm$ 0.43	4.08 $\pm$ 0.35	19.930**	
	Paired 't' value	1.661	13.361**		
Government sources	Before intervention	2.71 $\pm$ 0.55	3.06 $\pm$ 0.62	3.281**	I
	After Intervention	2.72 $\pm$ 0.55	4.33 $\pm$ 0.40	20.138**	
	Paired 't' value	1.0	16.459**		

\* p < 0.05 but > 0.01 ; \*\* p < 0.01; (Mean range: 1-5)

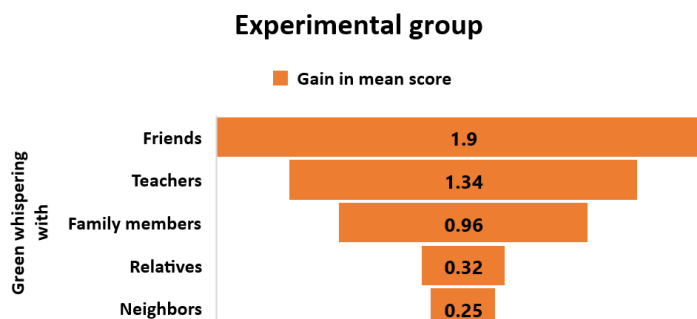
**Table 8:** Change in green whispering of respondents after intervention (N=150)

Green whispers		Groups		t' value	Ranking for experimental group
		Control (n=50)	Experimental (n=100)		
		Mean score $\pm$ SD	Mean score $\pm$ SD		
Friends	Before intervention	1.14 $\pm$ 0.35	1.0 $\pm$ 0.0	4.008**	I
	After Intervention	1.14 $\pm$ 0.35	2.90 $\pm$ 0.86	13.819**	
	Paired 't' value	-	21.976**		
Family members	Before intervention	1.14 $\pm$ 0.35	1.0 $\pm$ 0.0	4.008**	III
	After Intervention	1.14 $\pm$ 0.35	1.96 $\pm$ 0.95	5.925**	
	Paired 't' value	-	10.142**		
Teachers	Before intervention	1.10 $\pm$ 1.30	1.07 $\pm$ 0.25	0.635	II
	After Intervention	1.10 $\pm$ 1.30	2.41 $\pm$ 0.95	9.500**	
	Paired 't' value	-	13.634**		
Relatives	Before intervention	1.0 $\pm$ 0.0	1.0 $\pm$ 0.0	-	IV
	After Intervention	1.0 $\pm$ 0.0	1.32 $\pm$ 0.46	4.818**	
	Paired 't' value	-	6.828**		
Neighbours	Before intervention	1.0 $\pm$ 0.0	1.0 $\pm$ 0.0	-	V
	After Intervention	1.0 $\pm$ 0.0	1.25 $\pm$ 0.45	3.855**	
	Paired 't' value	-	5.461**		

\* p < 0.05 but > 0.01 ; \*\* p < 0.01; (Mean range: 1-5)

As friends often serve as primary group where individual feels comfortable discussing ideas, practices and convincing to friends is easier as compared to other social circle. Moreover, friendship often involve informal conversations which create more opportunities for enhancing information

and reinforcing towards green practices. The overall improvement in green whispering practices has inclined with the mean score raised from  $\bar{x}=1.01$  to  $\bar{x}=1.97$ . While control group did not show any changes regarding green whispering. These findings highlight the effectiveness of the interventions in enhancing green whispering practices in the experimental group. The study goes in the line with researches conducted by (Defra 2008; Hossieni et al., 2015; Kigaru et al., 2015; Micael and Hooper, 2016; Dam and Trijp, 2016; Sharma et al., 2018; White et al., 2019; Miller, 2019) who developed interventions, approaches, strategies to change a behaviour of participants using different behavioural models, frameworks and steps.



**Fig. 2.** Change in mean score of experimental respondents regarding green whispering after intervention

**Table 9.** Relationship of socio-personal variables of respondents with change in awareness about green practices, green information seeking and whispering practices

Socio-personal variables	Experimental group		
	Awareness about green practices	Green information seeking	Green whispers
Age (years)	0.104	0.053	0.031
Standard	-0.263**	-0.004	-0.101
Grades in the last class	0.055	-0.047	0.141
Family income	0.172	0.072	-0.209*
Family education	-0.041	-0.139	0.023

\*Significant at 5 % level; \*\* Significant at 1 % level

Results from table 9 reveals that standard of school students has significantly negative correlation with awareness regarding green practices. This could imply that lower class students may not change themselves in terms of awareness. Further family income of the students shows significant negative correlation with change in green whispering, this could be implied that as the income of the family increases, they do not bother to share information and convince others to act as green. The results are aligned with the study conducted by (Roberts, 1996; Olli et al., 2001; Akehurst et al., 2012; Tilikidou, 2013; Balaji and Anbalagan, 2017) that reported insignificant or negative relationships of income with all dimensions of green practices.

### Conclusion

The overall findings underscore the effectiveness of structured interventions in enhancing awareness, green information seeking and whispering practices using 'Fogg behavior model' to ensure behaviour change. The results showed a significant increase in awareness, information seeking and whispering practices in experimental group students with a mean score improved from  $\bar{x}=2.69$  to  $\bar{x}=3.67$  for information seeking and  $\bar{x}=1.04$  to  $\bar{x}=1.97$ , for green whispering practices. Therefore, framework of Fogg Behavior Model was successful in changing the behaviour amongst school students. The findings are aligned with the results of studies conducted by (Guimareas et al., 2018; Lin, 2024; Wang et al., 2024; Leila et al., 2023) who developed interventions and approaches based on Fogg Behavior Model to change the behaviour of participants and found the model successful in persuading others to form a habit and change a behaviour.

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#### Author Contributions

SG, RMG and PS conceived the concept, wrote and approved the manuscript.

#### Acknowledgements

Not applicable.

#### Funding

Funding was provided by the University Grant Commission, India.

#### Availability of data and materials

Not applicable.

#### Competing interest

The authors declare no competing interests.

#### Ethics approval

Verbal consent was obtained from each of the school administration and all the subjects involved in the study to conduct research.



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**Citation:** Garbyal S, Gupta RM and Sharma P (2025) Building Green Awareness and Practices among Urban School Students through Interventions Based on Behaviour Change Model. *Environmental Science Archives* 4(2): 485-493.