

Effectiveness of Ecopedagogy on Student-Teachers' Pro-Environmental Behaviour

^[1] Wankyrshan Rymbai, ^[2] Prof. S.M.Sungoh

^[1] Research Scholar, Department of Education, North-Eastern Hill University, Shillong, Meghalaya, India

^[2] Professor, Department of Education, North-Eastern Hill University, Shillong, Meghalaya, India

Email: ^[1] wankyrshanrymbai@gmail.com, ^[2] smsungoh@gmil.com

Abstract— Ecopedagogy is a critical environmental pedagogy which focuses on understanding the connections between social interaction and environmentally harmful acts carried out by humans. It provides students with an opportunity to critically examine an environmental problem and devise solutions to these problems. The objective of the present study is to investigate the effectiveness of ecopedagogy on pro-environmental behaviour of pre-service D.El.Ed. student-teachers in Meghalaya. An experimental method was employed with a pre-test post-test control group design. The sample of the study consisted of 190 student-teachers. Descriptive and inferential statistics were used for analysing the data. The finding indicated an improvement in the levels of pro-environmental behaviour of student-teachers after the exposed to ecopedagogy and existence of a significant difference in the effectiveness of ecopedagogy on pro-environmental behaviour of student-teachers of the experimental group. The study recommends the integration of ecopedagogy in the teaching-learning process to facilitate positive environmental behaviour and consciousness among student-teachers.

Keywords— Ecopedagogy, Pro-environmental behaviour, Student-teachers, District Institute of Education and Training, Diploma in Elementary Education

I. INTRODUCTION

Ecopedagogy is an approach to education that has emerged from critical pedagogy. It is a response to the planetary environmental crisis which is a result of the collective responsibility of humanity (Verret, 2012). It seeks the possibility of the creation of a new ecologically sustainable civilization and sees it in the fundamental, democratic and planetary reconstruction of the educational system (Grigorov & Fleuri, 2012)

Ecopedagogy seeks to make citizens of the earth endowed with the ability to reasonably take action for all life. It can empower learners to internalise pre-requisite dialogue attributes to care for the mother earth sustainably, eco-literate and providing the ability to know and understand the environment (K'Odhiambo, 2017). According to Herreria, Rodriguez, & Norat (2016), ecopedagogy is a movement that transits between critical pedagogy and complex thinking. It promotes an education that nurtures the transformation for the critical construction of a sustainable culture. Students find their identity, meaning and sense of their lives through the links that they establish out of their everyday life experiences.

According to Napitupulu & Munandar (2017), ecopedagogy is a way to connect to nature to critically examine environmental problems. It takes into account people, cultures and lifestyle, and it respects identity and diversity. It enables individuals to develop skills and strategies to

foster responsible environmental action along with encouraging individuals to live a more sustainable lifestyle. It provides students with the process of inquiry and an opportunity to critically examine an environmental problem and devise solutions. Ecopedagogy poses the environmental problems and teaches students how to cope with them through action, creativeness and dialogue, how to create a more just, sane and sustainable civilization instead just to adapt to the world. It cultivates in students critical thinking, consciousness-raising, the culture of dialogue and active democratic participation in society; promotes new crucial eco-literacies and socially responsible lifestyles, educates critically students for taking action for sustainability and social justice in a local and global society (BCSLDE, 2020). On the other hand, Pro-environmental behaviour is a term used to relate to environment-human behaviour relationship (Lee, Jan, & Yang, 2013). Pro-environmental behaviours (PEB) are actions that people do in daily life that are comparatively better for the environment, (Science for Environment Policy, 2012). Steg and Vlek (2009), defines Pro-environmental behaviour as behaviour that harms the environment as little as possible or even benefits the environment. According to Krajhanzl (2010), Pro-environmental behaviour is such behaviour which is generally judged in the context of the considered society as a protective way of environmental behaviour or a tribute to the healthy environment.

II. NEED AND JUSTIFICATION OF THE STUDY

Environmental problem is one of the problem affecting the state of Meghalaya. These environmental problems that we are experiencing today are the consequences of poor environmental behaviour, low environmental awareness, indifferent attitude and anti-environmental behaviour of the public in the state. To overcome this problem, there is a need through education to promote positive environmental behaviour, sound environmental practices and taking action towards the health of the environment. The investigator felt the need of developing an educational module based on ecopedagogy for students teachers of DIETs, Meghalaya and to measure its effect on pro-environmental behaviour among student-teachers of DIETs, Meghalaya.

III. OBJECTIVES OF THE STUDY

1. To find out the level of pro-environmental behaviour of male and female student-teachers.
2. To find out the difference in the level of pro-environmental behaviour between male and female student-teachers
3. To find out the effect of ecopedagogy and conventional methods on pro-environmental behaviour of male and female student-teachers.

IV. HYPOTHESES OF THE STUDY

1. There is no significant difference in the level of pro-environmental behaviour between male and female student-teachers
2. There is no significant difference in the effect of ecopedagogy on pro-environmental behaviour of male student-teachers of the experimental group before and after exposure to the treatment (Ecopedagogy).
3. There is no significant difference in the effect of ecopedagogy on pro-environmental behaviour of female student-teachers of the experimental group before and after exposure to the treatment (Ecopedagogy).
4. There is no significant difference in the mean scores of pro-environmental behaviour between male and female student-teachers of the experimental group after exposure to the treatment (Ecopedagogy).
5. There is no significant difference in the effect of conventional methods on pro-environmental behaviour of male student-teachers in the controlled group before and after exposure to the treatment (Conventional methods).
6. There is no significant difference in the effect of conventional methods on pro-environmental behaviour of female student-teachers in the controlled group before and after exposure to the treatment (Conventional methods).

V. METHODOLOGY

In the present study, experimental method was employed with a Pre-test Post-test Control Group design. Before assigning the participants to the experimental group and controlled group, pair matching technique was adopted to control the effect of intervening variable i.e., environmental awareness possessed by student-teachers. The sample was matched on environmental awareness scores by adopting the lottery method. In the process, 95 student-teachers assigned to the experimental group were exposed to ecopedagogy and another 95 student-teachers assigned to the controlled group were exposed to the conventional methods (lecture, library work and home assignment). The sample for the experimental study comprised of 190 first-year student-teachers taken from the three DIETs (Thadlaskein, Sohra, Tura). The statistical technique such as frequency, percentage, mean, standard deviation and t-test were used for analysing the data. The following self-constructed tools were used for the study. 1.Pro-Environmental Behaviour Scale 2. Environmental Awareness Test and 3. Ecopedagogy module.

VI. RESULT AND DISCUSSION

- i. Level of Pro-Environmental Behaviour (PEB) of male and female student-teachers before the exposure to the treatment.

Table 1: Level of Pro-Environmental Behaviour of Male and Female Student-teachers

Male		Female		Levels of Pro-Environmental Behaviour
N	%	N	%	
				Extremely Favourable
		3	2.06	High Favourable
4	9.09	11	7.54	Above Average
15	34.09	84	57.53	Average
21	47.73	35	23.97	Below Average
3	6.82	9	6.16	Unfavourable
1	2.27	4	2.74	Extremely Unfavourable
44	100	146	(100)	

The study found that majority (47.73%) of male student-teachers have been placed in below-average level of Pro-Environmental Behaviour (PEB) followed by 34.09% on average level, 9.09% under the above-average level, 6.82% under the unfavourable level and 2.27% under the extremely unfavourable level of PEB respectively. The study also revealed that majority (57.53%) of female student-teachers have been placed under the average level of Pro-Environmental Behaviour (PEB) followed by 23.97% under the below-average level, 7.54% above-average level, 6.16% under the unfavourable level, 2.74% under the extremely unfavourable level and 2.06% under the high favourable

level of PEB respectively. The study also showed that a higher percentage (57.53%) of female student-teachers falls under the average level of PEB, whereas, the majority (47.73%) of male student-teachers fall under the below-average level of PEB.

The finding point in the same direction as those of the previous researchers Shafiei and Maleksaeidi (2020); Kennedy and Kmec (2018); Gupta (2018); Manikandan (2015); Gaurav (2015); Merger et al.,(2013); Alp et al.,(2008) and Blocker and Eckberg (1994) which shows that female had higher level of PEB. The popular explanation to this result is that females student-teachers are more compassionate, connected, caring, nurturing, expressive, concerned and helpful in caregiving role towards the environment.

ii. The difference in the Level of Pro-Environmental Behaviour (PEB) between male and female student-teachers

Table 2: Difference in the Level of Pro-Environmental Behaviour between male and female student-teachers

Sex	n	Mean	SD	df	t-value	p
Male	44	226.41	10.83	188	3.62	0.01*
Female	146	235.18	14.88			

*Significant at 0.01 level
 $t(188) = 3.62$ and $p = 0.01$

An independent samples t-test was computed to find out the significant difference in Pro-Environmental Behaviour between male and female student-teachers. Table 2, revealed that t-value was 3.62 which was significant at 0.01 level with $df = 188$. Hence, the null hypothesis was rejected.

Table 3: Difference in the effect of ecopedagogy on Pro-Environmental Behaviour (PEB) between male and female student-teachers of the Experimental group

Part	Gender	n	Scores	Mean	SD	df	t-value
1	Male	20	Pre-test	226.9	13.95	38	9.18
		20	Post-test	271.1	16.38		
2	Female	75	Pre-test	234.63	14.60	148	14.62
		75	Post-test	274.15	18.29		
3	Male	20	Post-test	271.1	16.38	93	0.67
	Female	75	Post-test	274.15	18.29		

$t_M(38) = 9.18$ and $p = 0.02$, $t_F(148) = 14.62$ and $p = 0.02$, $t_{M\&F}(93) = 0.67$ and $p = 0.01$.

The table 3 under part 1, indicated the t-value to be 9.18 which was significant at 0.02 level with $df = 38$. Hence, the null hypothesis was not accepted. In the light of this result, it can be interpreted that there was a significant difference in the effect of ecopedagogy on Pro-Environmental Behaviour of male student-teachers of the experimental group after exposure to the treatment. The mean difference of 44.2 was in favour of a post-test score. This reflects that ecopedagogy was effective in promoting the pro-environmental behaviour

of male student-teachers of DIETs, Meghalaya who were in the experimental group. Statistically, it can be interpreted that there exist a significant difference in the level of Pro-Environmental Behaviour between male and female student-teachers of DIETs, Meghalaya. The mean difference of 8.77 was in favour of female student-teachers. This reflects that female student-teachers possess a higher level of Pro-Environmental Behaviour as compared to male student-teachers. It also explains behaviour such as respecting, caring, concerning, co-operating and empathy towards the environment was higher among female student-teachers of DIETs, Meghalaya as compared to male counterparts. The result differs from that of Eze (2020); Sivamoorthy (2015); Nagra and Kaur (2014); Samal (2013) which shows that male possess higher level of PEB but is in agreement with previous studies of Gupta (2018); Gaurav (2015); Erdogan et al., (2012); Aydin et al., (2011); (Arnocky & Stroink, 2010); and Lee (2009) which observes that, statistically female displays a significantly different and higher level of PEB as compare to their male counterparts.

iii. The difference in the Effectiveness of Ecopedagogy module on Pro-Environmental Behaviour based on gender.

To test the null hypotheses 2, 3 and 4, one-tailed t-test was applied as an improvement after the completion of the intervention programme was expected. The table 3 shows the computation of the t-test and mean score difference in the overall PEB scores of the student-teachers before and after the programme. The results of the same are given below.

The table 3 under part 2, revealed the t-value to be 14.62 which was significant at 0.02 level with $df = 148$. Thus, the null hypothesis was not accepted. Statistically, this result can be interpreted that there was a significant difference in the effect of ecopedagogy on Pro-Environmental Behaviour of female student-teachers of the experimental group after exposure to the treatment. The mean difference of 39.52 was

in favour of a post-test score. This indicates that ecopedagogy was effective in enhancing the pro-environmental behaviour of female student-teachers of DIETs, Meghalaya who were in the experimental group. The table 3 under part 3, showed that t -value is 0.67 which was not significant at 0.01 level with $df = 93$. Hence, the null hypothesis was not rejected. Based on this result, it can be interpreted that there was no significant difference in the mean scores of male and female student-teachers in pro-environmental behaviour leading to the acceptance of the null hypothesis. It shows that both male and female student-teachers have equally benefitted from the treatment (ecopedagogy). This explains that ecopedagogy is equally

effective for both male and female student-teachers of DIETs, Meghalaya.

iv The difference in the Effectiveness of Conventional methods on Pro-Environmental Behaviour based on gender.

To investigate the null hypotheses 5 and 6, one-tailed t-test was computed as an improvement after the completion of the intervention programme was expected. The table 4 shows the computation of the t-test and mean score difference in the overall PEB scores of the student-teachers before and after the programme. The results of the same are given below.

Table 4: Difference in the effect of conventional methods on Pro-Environmental Behaviour of male and female student-teachers of the Controlled group

Part	Gender	n	Scores	Mean	SD	df	t -value
1	Male	24	Pre-test	226	15.83	46	1.38
		24	Post-test	229.12	15.49		
2	Female	71	Pre-test	235.76	13.88	140	1.62
		71	Post-test	239.90	14.13		

$t_M(46) = 1.38$ and $p = 0.02$, $t_F(140) = 1.62$ and $p = 0.0$,

The table 4 under part 1, indicated the t -value to be 1.38 which was not significant at 0.02 level with $df = 46$. Hence, the null hypothesis was accepted. Statistically, the result can be interpreted that there was no significant difference in the effect of conventional methods on Pro-Environmental Behaviour of male student-teachers of the controlled group after exposure to the treatment. This implies that conventional method was ineffective in promoting the pro-environmental behaviour of male student-teachers of DIETs, Meghalaya who were in the controlled group.

The table 4 under part 2, revealed the t -value to be 1.62 which was not significant at 0.02 level with $df = 140$. Hence, the null hypothesis was accepted. In the light of this result, it can be interpreted that there was no significant difference in the effect of conventional methods on Pro-Environmental Behaviour of female student-teachers of the controlled group after exposure to the treatment. This suggests that conventional method was not effective in enhancing the pro-environmental behaviour of female student-teachers of DIETs, Meghalaya who were in the controlled group.

The findings establishes a strong explanation that ecopedagogy shows a statistically significant improvement in facilitating and promoting changes in the environmental behaviour of the student-teachers of the experimental group. The computed one-tailed t-test reveals a statistical difference in the effect of ecopedagogy on pro-environmental behaviour of student-teachers of the experimental group. The statistical mean differences were in favour of the post-test scores which explains the role of

ecopedagogy as an effective treatment in facilitating and enhancing the pro-environmental behaviour of student-teachers of the experimental group. Nevertheless, the findings from the analysed data of student-teachers from the controlled group reveals no statistical difference in the pro-environmental behaviour of the student-teachers post-intervention programme. Therefore, the result provides evidence that conventional methods like lecture method, home assignment and library work had negligible impacts on environmental behaviour of the student-teachers of the controlled group. From this standpoint, ecopedagogy can be considered as the major contributing factor in facilitating and reinforcing positive environmental behaviour in the student-teachers of DIETs, Meghalaya.

The pattern of results of the present study is consistent with the previous literature of Goyal (2017); Erdogan (2015); Alexander (2012); Jindal (2010); Schneller (2008); Yung, Huang and Kawata (2002); Goswami and Pirta (2002); which shows that students of the experimental group response positively to the intervention programme and post-test result indicated a significant effect in developing and facilitating responsible environmental behaviour among the students. Findings of the study also shows that ecopedagogy, statistically improve and facilitate positive environmental behaviour of the student-teachers of the experimental group. The results are in accordance with the findings of the previous studies of Napitupulu and Munandar (2017); Berberoglu (2015); Surata, Jayanti and Lansing (2015); Eryaman et al., (2010); Jackson (1999); which indicates that ecopedagogy influences and improves the environmental behaviour of students and teachers. The

finding implies that ecopedagogy is an effective approach in bringing changes in the behaviour of student-teachers of DIETs, Meghalaya towards the conservation of biodiversity like animals, plants, wildlife and medicinal plants; conservation of forest resources, tree plantation; practising waste reduction measures, reducing pollution of water and air and displaying concern towards a social cause like home violence and child labour. Other studies conducted by Alexander (2012); Okur-Berberoglu and Uygun (2013); Bajd and Lescanec (2011); shows that the conventional method had no significant effect on the environmental behaviour of the student. These findings are in agreement with the present study which indicates that the conventional methods had no significant effect on the behaviour of the student-teachers of the controlled group.

VII. RECOMMENDATIONS

1. Practical-based approach is to be integrated into the teacher training programme and for deliberation of various topics from the natural and socio-cultural environment so that student-teachers are provided with an opportunity to discuss, analyse and study these issues in a more comprehensive and in-depth manner.
2. Teacher educators should plan the teaching-learning process which involve critical thinking, logical reasoning, analytical skills, problem-solving, assigning project work and case study to probe locally environmental problems and assigning practical-based activities based on cognitive skills.
3. Teacher educators should implement ecopedagogy approach in the teaching-learning process where a combination of strategies like, dialogue, participatory, case-study, field study, group discussion, role play, brainstorming, critical reflection, contextualisation, documentation, creative writing, debate, seminar (based on their applicability and suitability) can be integrated to improve the pro-environmental behaviour in the student-teachers.

VIII. CONCLUSION

The result of the present study has brought some light about the effectiveness of ecopedagogy approach in facilitating positive environmental behaviour among student-teachers of DIETs, Meghalaya. The findings revealed that there was a significant improvement in the student-teachers' pro-environmental behaviour as a result of their exposure to ecopedagogy approach in relation to biodiversity conservation, forest conservation, waste management reduction, environmental pollution and socio-cultural issues such as domestic violence and child labour. Implementation and integration of this approach in the teaching-learning process will further facilitate and enhance students' pro-

environmental behaviour and consciousness for sustainable development.

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