



A STUDY OF ECO-LITERACY AS A COMPONENT OF NATURALISTIC INTELLIGENCE AMONGST IN-SERVICE SCHOOL TEACHERS

Ms. Radhika Srinivasan*

M.Sc (Biochemistry); M.Sc. (Environmental Science); M.A (Education); NET (Education), Principal, The Shri Ram Universal School, Palava. *Corresponding Author

Dr. Usha Borkar

Associate Professor, Hansraj Jivandas College of Education, Khar.

ABSTRACT 'Being ecologically literate, or Eco literate, means, in our view, understanding the basic principles of ecology and being able to embody them in the daily life of human communities' Fritjof Capra

Eco-literacy or ecological literacy is the ability to understand the organization of natural systems and the processes that maintain the healthy functioning of living systems and sustain life on Earth. The term Eco literacy was first published 16 years ago by Capra (1997), who founded the Center for Eco literacy.

An ecologically literate person is able to apply this understanding to the design and organization of our human communities and the creation of a regenerative culture.

In 1983, Howard Garner revised the earlier notions of intelligence with his Theory of Multiple Intelligences, which set forth eight distinct types of intelligence and claimed that there need be no correlation among them.

Naturalistic Intelligence features is one among the eight intelligences listed by Gardner.

Concept of Naturalistic Intelligence (NI): Gardner designates naturalistic intelligence as the human ability to discriminate among living things (plants, animals) as well as sensitivity to other features of the natural world (clouds, rock configurations).

This intelligence has to do with observing, understanding, and organizing patterns in the natural environment. Children possessing naturalistic intelligence may enjoy subjects, shows, and stories that deal with animals or natural phenomena, or they may show unusual interest in subjects like biology, zoology, botany, geology, meteorology, paleontology, or astronomy.

Naturalistic Intelligence may manifest itself in various dimensions and have many components such as

- Pro-Environmental behavior
- Eco-Literacy
- Environmental Attitude
- Eco-sensitivity etc

KEYWORDS : Naturalistic Intelligence, Eco-Literacy, In-service teachers

INTRODUCTION

'One of the most urgent issues facing humanity is fixing our broken relationship with the Earth on which all life depends'

Sir Ken Robinson

In-service schoolteachers in India and perhaps the world over are much hassled by virtue of their hectic schedules, deadlines to complete syllabi, school events and more.

Additionally, they are required to put in at least a few hours of professional development and ensure that they are suitably prepared for the changes and uncertainties of the system.

Hence, adding another element of ecological literacy may seem to be burdensome and tiring for them.

But in the light of our current scenario where our Earth is teetering on the brink and quick decisive actions are necessary to ensure that no further damage is done, we must quite emphatically ensure that teachers become ecologically literate.

Our future generation needs to be urged to live responsibly, consume judiciously and respect the balance of nature that we may irrevocably damage.

Thus, ecological literacy is an important component of learning and immersion for in-service school teachers.

Ecological Literacy

Eco literacy is founded on a new integration of emotional, social, and ecological intelligence—forms of intelligence popularized by Daniel Goleman. While social and emotional intelligence extend students' abilities to see from another's perspective, empathize, and show concern, ecological intelligence applies these capacities to an understanding of natural systems and melds cognitive skills with empathy for all of life. By weaving these forms of intelligence together, Eco literacy builds on the successes—from reduced behavioral problems to increased academic achievement—of the movement in education to foster social and emotional learning. And it

cultivates the knowledge, empathy, and action required for practicing sustainable living.

An eco-literate educator must cultivate these unique qualities

1. Develop empathy for all forms of life
2. Embrace sustainability as a community practice
3. Make the invisible visible
4. Anticipate unintended consequences
5. Understand how nature sustains life
6. Make meaningful connections between nature, natural systems, climate, economics and commerce
7. Be quick and resourceful to highlight and adopt strategies that will enhance sustainable practices
8. Be able to draw conclusions and know the impacts and consequences of human actions on the environment.

Traditionally, India has many regenerative and restorative practices in agriculture, medicine, trade, commerce and ways of living; but sadly we seem to be forgetting these indigenous practices and are fast turning into a 'use and throw generation' with scant regard for waste management or the load that it imposes on the earth's resources.

An eco-literate person will have the resources to understand these and other important concepts Orr (1990, 1992, 1994) argues that education is the most powerful mechanism to address the world's environmental challenges.

He propounds that no student should graduate from any educational facility without knowing 17 key subject areas, in other words pedagogical content knowledge. Orr (1992, p. 109) refers to this complex knowledge base as a 'syllabus for ecological literacy'. Echoing Allan Bloom's approach, he nominates over one hundred articles and books as essential readings for all students and teachers. Orr (1992) draws works from distinguished philosophers such as Ehrlich, Bacon, Kahn, Berry, Merchant, Emerson, Lovelock, Eiseley, Leopold and Thoreau.

Statement Of The Study

A study of the effect of the Learning package on Eco-literacy level

as a dimension of Naturalistic Intelligence amongst in-service schoolteachers

Review Of Related Research Studies Conducted In India

Joyce, M. and D'Souza, S. (2016) have conducted research on Pedagogical interventions for Sustainable Development which elucidates ways of educating students for sustainable development and the same has been illustrated with a specific example on climate change. The student teachers are considered to be the target group of the study, since they are the ones who are attempting to achieve the aim of sustainable development in the educational set up.

Dr. Rema Devi, K. and Pradeep, R. (2016) have conducted a research on Naturalistic Intelligence and awareness on sustainable development among tribal students at Secondary level and the study showed the relationship between naturalistic intelligence and awareness on sustainable development of rural students of secondary level wherein sustainable development aims at creating chains of mutual, social, economic and environmental benefits at local and global level.

Studies Conducted Abroad

Okur-Berberoglu, E. (2018). *Development of an Eco literacy scale intended for adults and testing an alternative model by structural equation modelling. International Electronic Journal of Environmental Education, 8(2), 15-34* conducted a Research that goes from theory (literature review) to praxis (experimental/experiential applications). In terms of ecoliteracy, this way might be thought from the opposite side. Researchers might go from praxis to theory. He states that Eco literacy has five subsets: ecological intelligence, social intelligence, emotional intelligence, economy and green consumer behavior. Social intelligence, emotional intelligence and economy has a connection with ecological intelligence while ecological intelligence has a relationship with green consumer behavior. If social intelligence, emotional intelligence or economy subjects are improved then they might affect the development of ecological intelligence and thereby they might be effective on green consumer behavior according to the alternative Eco literacy model.

Daniel Goleman, Lisa Bennett, and Zenobia Barlow, 2013, have conducted research and thereby explain how we can teach kids to care deeply about the environment.

In their essay: *Eco literate: How Educators Are Cultivating Emotional, Social, and Ecological Intelligence*, they explain how educators can extend the principles of social and emotional intelligence to include knowledge of and empathy for all living systems. They believe that educators who cultivate these practices offer a strong foundation for becoming ecoliterate, helping themselves and their students build healthier relationships with other people and the planet. Each can be nurtured in age-appropriate ways for students, ranging from pre-kindergarten through adulthood, and help promote the cognitive and affective abilities central to the integration of emotional, social, and ecological intelligence.

Mirrahimi, S.Z. Tavil, N.M. Abdullah, N.A.G; Surat M; Usman I.M.S (2011) have conducted a research on Developing Conducive Sustainable Outdoor Learning: The impact of natural environment on Learning, Social and Emotional intelligence and results of the study are that outdoor learning and engaging with nature environment provide opportunities to improve academic achievement and social emotional intelligence for students; so, the features of landscape have influence to develop acquiring awareness in natural environment, training for sustainability and various green systems, learning by smelling, feeling, tasting. The research provides conclusive evidence that a good design for outdoor learning and engaging with nature plays an important role to promote students' abilities such as academic achievement and social behaviors.

Littledyke, M. (2008) has conducted a research on Science Education for Environmental Awareness: Approaches to Integrating Cognitive and affective domains where the research states that the cognitive and affective domains need to be explicitly integrated in a science education that informs environmental education, as a sense of relationship is essential for environmental care and responsibility leading to informed action. The features of such approaches to science education are discussed through analysis of the impact of modern and constructive postmodern science education models on environmental

education, and possible strategies for making connections between cognitive and affective domains are proposed.

Wooltorton (2006) conducted a research and described the Six elements of ecoliteracy: (1) ecological self—a sense of interconnectedness with the cycle of life on the basis of care and compassion, expansiveness of the soul and respect for others on the basis of respect for difference; (2) sense of place and active citizenship—engagement in local culture, history, and organic community together with the ecosystem; (3) systems thinking and relationship—a sense of relationality, connectedness, and context; (4) the ecological paradigm—study of the whole, relationships, and networks, a focus on contextual knowledge, consideration of quality, attention to processes, study of patterns; (5) pedagogy of education for sustainability—an experiential, participatory and multidisciplinary approach, focusing on the learning process; (6) reading the world of nature and culture—engagement with nature as early in life as possible with ecoliteracy as first literacy.

Green Com Environmental Education and Communication Project (2000) has conducted a research on Lessons from school based environmental education programs in three African countries and results provide useful ideas for those who are interested in designing or improving school-based programs—whether as implementers, funders, or local partners.

Environmental education (and child education per se) can be examined in terms of particular models or theories including a brief overview of other environmental education activities around the world and give positive strategies for enhancing environmental education.

Objectives Of The Study

The following are the Objectives of the study

1. To study the impact of the Learning Package on the eco-literacy levels as a component of naturalistic Intelligence of in-service teachers on the basis of gender
2. To study the impact of the Learning Package on the eco-literacy levels as a component of Naturalistic Intelligence of in-service teachers on the basis of age (Above 40 years of age and below 40 years of age)
3. To study the impact of the Learning Package on the eco-literacy levels as a component of Naturalistic Intelligence of in-service teachers on the basis of their educational level (Graduates and Postgraduates)
4. To study the impact of the Learning Package on the eco-literacy levels as a component of Naturalistic Intelligence of in-service teachers on the basis of the levels taught (Pre-primary, Primary, Secondary)

Null Hypotheses Of The Study

1. After completing the Learning Package, there will be no significant difference in the eco-literacy scores of in-service teachers on the basis of gender
2. After completing the Learning Package, there will be no significant difference in the eco-literacy scores of in-service teachers on the basis of age
3. After completing the Learning Package, there will be no significant difference in the eco-literacy scores of in-service teachers on the basis of educational level
4. After completing the Learning Package, there will be no significant difference in the eco-literacy scores of in-service teachers on the basis of levels taught.

Operational Definitions For The Study

1. *Eco-literacy or Ecological Literacy*- It can be defined as the ability to understand the natural systems that make life on earth possible. To be eco-literate means understanding the principles of organization of ecological communities or ecosystems and using these principles for creating sustainable human communities.
2. *Naturalistic Intelligence*-the human ability to discriminate among living things (plants, animals) as well as sensitivity to other features of the natural world (clouds, rock configurations).
3. *School*- For the purpose of this study, the school considered is an English medium school affiliated to the ICSE curriculum, where the medium of instruction is English only
4. *In-service teachers*- For the purpose of this research, in-service teachers refer to teachers teaching in English medium schools affiliated to the ICSE board in Mumbai and teaching in Pre-primary (ages 3 to 5), Primary (ages 6 to 10) and Secondary (ages

11 to 15) levels.

5. **Learning Package-** A compact plan of procedures to bring a desired standard or condition or behaviour, by instruction and practice; to do or achieve something according to the plan.
6. **Pre-Primary-** The section of school that caters to the education of students from 3 to 6 years of age
7. **Primary-** The section of the school that caters to the education of students from approximately 6 to 10 years of age
8. **Secondary-** The section of the school that caters to the education of students from approximately 10 to 15 years of age.

For the purpose of this study the Learning Package would be developed for a duration of approximately 60 hours. The package would include both online and offline content and would be based on the ADDIE model.

Scope And Delimitations Of The Study

The present study was restricted to:

- In-service teachers teaching in English medium private schools
- In-service teachers teaching Pre-primary, Primary and Secondary sections
- In-service teachers having an educational qualification of Graduation and Post-graduation
- In-service teachers of 40 years and below and above 40 years of age
- The study does not cover the following aspects of teachers
- Teachers teaching in schools following other language mediums (Such as Hindi/Marathi)
- Teachers teaching in government schools or semi-government schools
- Schools in other parts of the city
- Teachers who are currently not in service
- Family backgrounds that may preclude certain concepts of eco-literacy
- Exposure to social media and news articles relating to the environment
- Challenges and outcomes as impacted by the Covid-19 pandemic

Research Methodology Of The Study

For the present study a true experimental design was employed as follows:

Pre-test: Post-test True experimental design

The research design is composed of two randomly assigned groups i.e. Experimental and Control, which are pre-tested before the implementation of treatment on the experimental group. The results of the pre-testing if indicative of a high NI quotient, such sample members would be excluded from the research study.

In addition, while treatment is implemented on the Experimental group only, post-test observation is carried out on both the groups to assess the effect of manipulation.

SAMPLING

A Stratified random sampling method was employed to select 4 English medium private schools.

Care was taken to include the schools in the geographical area of Thane District and Navi Mumbai, so as to adhere to a particular demographic profile of parents and students.

Due to the restrictions imposed by the COVID-19 pandemic, the researcher used online and digital data collection methods like Google Forms, Online surveys etc.

Data was collected from approximately 250 teachers of the 4 selected schools.

TOOL FOR THE STUDY

For the purpose of this study the following research tool used was: *Quantifying and Understanding Ecological Literacy* created by **Anna Elizabeth Mc Ginn (2014)**

Techniques For Analysing The Data

The researcher used mean, median, mode, standard deviation, skewness, and kurtosis for the descriptive analysis of the data and t-test and one-way ANOVA for the inferential analysis of the data.

Findings Of The Study

The findings of the study have been analyzed under the criteria as

specified below:

On the basis of Gender:

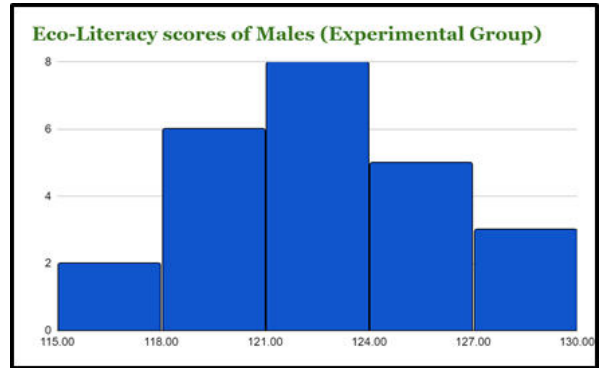


Figure 1.1

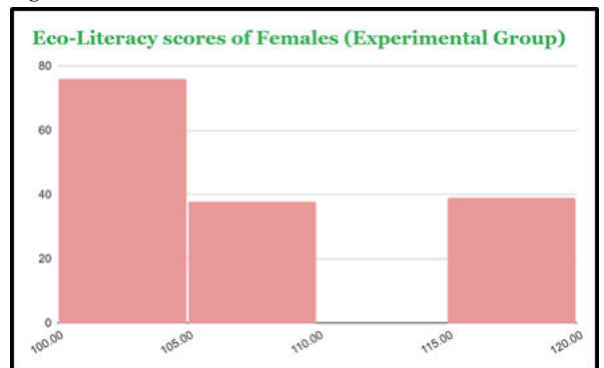


Figure 1.2

Comparison Of Mean Scores And Standard Deviations

Table 1.1

	Males	Females
Mean	122.208	107.300
Standard Deviation	3.55	5.251

Analysis Of Results On The Basis Of Gender

The Null Hypothesis (H₀) can be rejected at the significance level 0.05, because the p-value does not exceed 0.05.

Thus we can conclude that there will be a significant difference in the Eco-Literacy scores of Males and females thus leading us to the conclusion that Gender does play a role in Eco-Literacy.

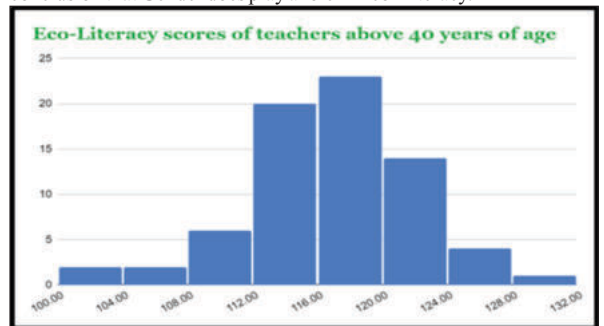


Figure 1.3

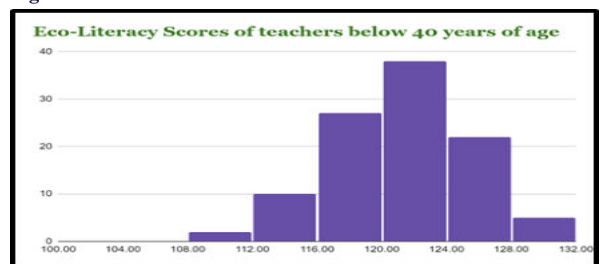


Figure 1.4

Table 1.2

	Teachers above 40 years of age	Teachers below 40 years of age
Mean	116.712	120.682
Standard Deviation	6.560	4.213

Analysis Of Results On The Basis Of Age

The Null Hypothesis (H_0) can be rejected at the significance level 0.05, because the p-value does not exceed 0.05.

Thus we can conclude that there will be a significant difference in the Eco-Literacy scores of Teachers above 40 years of age and below 40 years of age, thus leading us to the conclusion that Age does play a role in acquiring knowledge, skills and attitudes of Eco-Literacy.

DISCUSSION ON THE BASIS OF GENDER AND AGE

Sheryn D. Pitman , Christopher B. Daniels and Paul C. Sutton in their research entitled

‘Ecological literacy and socio-demographics: who are the most eco-literate in our community, and why?’ Have examined the nature of male and female experiences of place through childhood and adolescent years (Matthews 1987; Wridt 1999). Young boys, for example, have been found to enjoy greater environmental freedoms and to be granted permission to explore at greater distances from their homes, while the range of girls is more often restricted to domestic settings. This has been shown to be the case in both suburban and rural environments (Matthews 1987). Moreover, children who roam further from home can recall greater levels of environmental detail and information (Matthews 1987). As a consequence, pronounced gender induced differences in spatial awareness and environmental capability have been found to emerge as childhood progresses (Matthews 1987). These findings are in consonance with the researcher’s findings too.

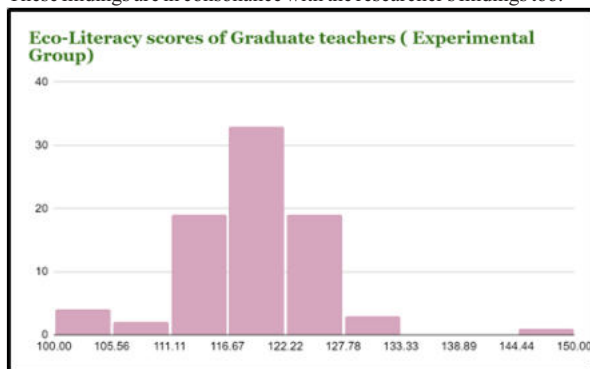


Figure 1.5

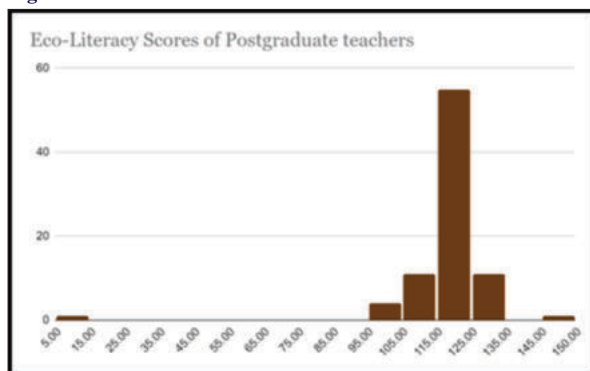


Figure 1.6

Table 1.3

	Graduate teachers	Postgraduate teachers
Mean	119.296	118.510
Standard Deviation	6.731	5.105

As seen in Table 1.3, The mean scores of Graduates and Postgraduates are different;

Mean (Graduates) > Mean (Postgraduates) and the calculated p-value indicates that the degree of significance is high; hence

The Null Hypothesis is accepted.

Thus, we can conclude that there will be no significant difference between the EL scores of graduate and post-graduate teachers, thus we can infer that educational attainment or level is not a factor for consideration for Eco literacy.

Discussion On The Basis Of Educational Background / Educational Attainment

Nixon ,1970 and Odum, 1984, say that “It is also vital that our entire society develops a new understanding and a new awareness of man’s relation to his environment”

As they conclude in their research, *‘Ecological literacy does not necessarily require the ability to read ecological literature or the ability to read at all. It does, however, include “reading” the patterns, cycles and systems of the Earth, knowing that the whole of the Earth as an ecosystem is greater than the sum of its many parts (Odum, 1984) and realizing that human actions should nurture the integrity of the Earth.’*

In keeping with these researches and ideas, the researcher thus concludes that a formal degree is by no means an indicator of being ecologically sensitive, conscious or literate.

In fact, we find that may people bereft of a formal education and living very simple lives in consonance and complete harmony with nature are perhaps the best ones to recognize patterns in Nature, the interrelationships and thus are more ecologically literate.

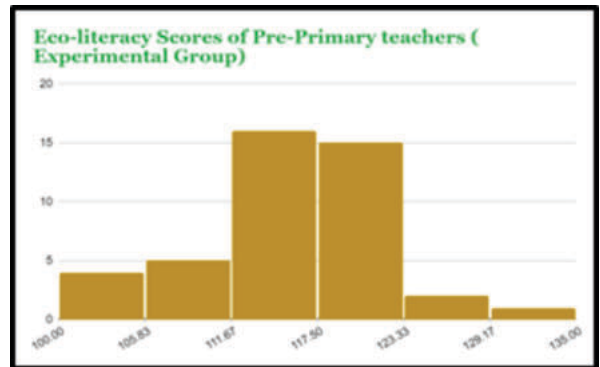


Figure 1.7

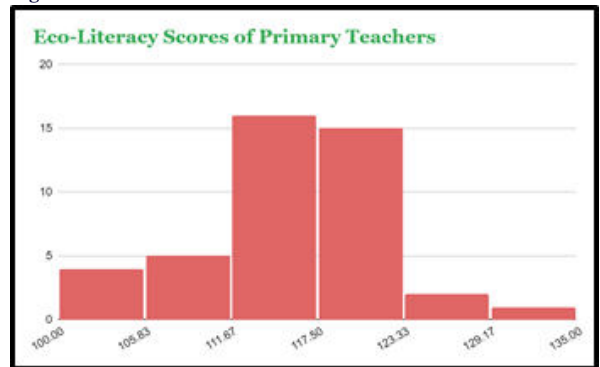


Figure 1.8

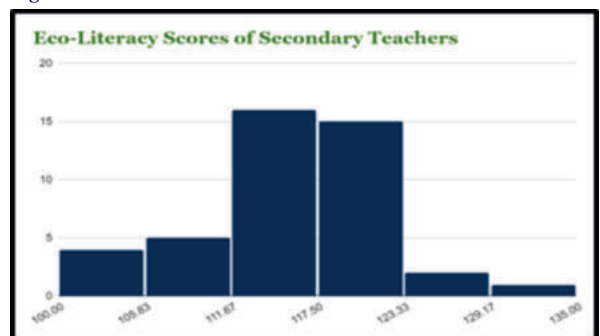


Figure 1.9

Table 1.4

	Pre-Primary teachers	Primary teachers	Secondary Teachers
Mean	115.627	118.921	121.888
Standard Deviation	6.392	5.922	3.248

Analysis on the basis of levels taught

As seen in Table 1.4, the mean values of the scores of the three groups of teachers and calculated p-value is < 0.05, hence the Null Hypothesis is rejected.

Hence, this implies that the level that a teacher teaches has an impact on the Eco-literacy levels too.

Discussion on the basis of Levels taught

As seen from the results of the research, Pre-Primary, Primary and Secondary teachers do differ in their Eco-Literacy dimension of Naturalistic Intelligence

As seen from Table 1.4, the mean scores of Secondary teachers are the highest indicating that perhaps the curriculum, resources and pedagogical inputs that are needed to teach the Secondary classes are in some ways also contributing to the eco-literacy concepts , skill and attitudes of the teachers. The subject matter for these grades may involve such inputs that help to develop these literacies.

Consequently, we find that pre-primary teachers may be limited in their exposure to such resources and unless they are personally committed to enhancing their own knowledge, the mean scores of these teachers is the minimum.

Primary teachers mean scores fall in between the above two groups, again indicating that their exposure to the content is more than the pre-primary teachers but less than the secondary teachers.

CONCLUSION OF THE STUDY

On the basis of the findings the researcher arrived at the following conclusions:

On the basis of gender

Gender does play a role in the acquisition of knowledge, skills and attitude of Eco-Literacy component of Naturalistic Intelligence

On the basis of Age

Age does play a role in the acquisition of knowledge, skills and attitude of Eco-Literacy component of naturalistic Intelligence

On the basis of educational attainment

Educational attainment does not play a role in the acquisition of knowledge, skills and attitude of Eco-Literacy component of Naturalistic Intelligence

On the basis of levels taught

Pre-Primary, Primary and Secondary teachers differ in their Eco-Literacy dimension of Naturalistic Intelligence

Suggestions

The current research has implications for different stakeholders, as follows:

For school administrations:

They must realize that Eco-Literacy is an important facet of school curricula school administrations must try to include and integrate it in various activities, aspects and events

For curriculum-framers

Curriculum framing and choosing pedagogical inputs to include in schools is a vital task and including concepts and elements of Eco-Literacy into school curriculum and textbooks would certainly give a huge impetus and ensure that future generations would be able live their lives responsibly and sustainably

For educators

As we move ahead to the next generation of learners, it is very important that educators must learn to master the concepts of Eco-Literacy so that they may be able to explain the meaning of our dependence and interrelationships of Nature, thus leading sustainable lives

For policymakers

This research has indicated that including the concepts, knowledge and

skills in school education would be extremely beneficial and could pave the way to ensure that we live responsible and mitigate and manage some of the major environmental issues that abound all around us.

CONCLUSION

The survival of humanity depends upon our ecological literacy – our ability to understand the basic principles of a connected Nature and how to live accordingly. This means that ecological literacy must become a critical skill for all humans to embrace if we are to remain on Earth.

We must attempt to develop Systems Thinking; this means that understanding life requires a shift of focus from objects to relationships.

Each species in an ecosystem helps to sustain the entire ecosystem.

Additionally, we must weave into our lives the concept of sustainability, which is not an individual property but a property of an entire web of relationships.

It always involves the entire biosphere, and this is the profound lesson we need to learn from Nature.

Once we become ecologically literate, we can understand the processes and patterns of relationships that enable ecosystems to sustain life.

