

Influence of Eco-Anxiety and Deductive Reasoning on Disaster Risk Reduction of Higher Secondary School Students



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Abstract

Disaster Risk Reduction (DRR) education is essential for equipping higher secondary school students with the knowledge and skills necessary to respond effectively to natural and environmental hazards. In recent years, the rising concern over climate change and environmental issues has contributed to increased Eco-Anxiety—a persistent fear of environmental doom—among youth. This emotional stress may influence students' ability to reduce the risk of disaster. At the same time, Deductive Reasoning, a fundamental cognitive skill, enables students to analyze information logically and make informed decisions during emergencies. The key purpose of the study is to examine the influence of Eco-Anxiety and Deductive Reasoning on Disaster Risk Reduction of higher secondary students. The population of the study consists of higher secondary school students of Kerala. A total of 160 students were selected through simple random sampling for this quantitative study and a normative survey method was adopted for collecting data. Data were collected using an Eco-Anxiety Scale, a Deductive Reasoning Test, and a Disaster Risk Reduction Scale. Statistical analyses including correlation and regression analysis were conducted to explore relationships and predictive effects. The Result of the study indicated that there exists a negative correlation between Disaster Risk Reduction and Eco-Anxiety, signifying that higher anxiety reduces students' ability to reduce risk of disaster. On the other side, Deductive Reasoning showed a significant positive relationship with Disaster Risk Reduction, indicating that stronger deductive reasoning enhances students' ability to reduce the risk of disaster. Furthermore, Deductive Reasoning moderated the impact of Eco-Anxiety, partially offsetting its negative effects. The study concludes that fostering Deductive Reasoning and addressing Eco-Anxiety through education can significantly improve ability of disaster risk reduction among higher secondary students. Integrating emotional support and critical thinking development into Disaster Risk Reduction education supports to build resilient and well-prepared youth.

1. Introduction

Natural disasters have become more severe and frequent in recent years because of the increasing influence of climate change. The physical environment has been adversely affected by this global crisis, but individuals, especially adolescents, have also experienced substantial psychological implications. Specifically, among adolescents who are highly conscious of the uncertain environmental future they might inherit, eco-anxiety, a persistent worry about ecological emergencies and environmental decline, has become a growing concern among these behavioural consequences. Simultaneously, deductive reasoning—the capacity for thinking to process information logically and generate at good conclusions—is significant to how individuals perceive risks, make decisions, and act in disaster circumstances. The perception of and attitude to disaster challenges are significantly impacted by both eco-anxiety and deductive reasoning in higher secondary school students, who are at a vital juncture in their cognitive and emotional development.

The primary objective of disaster risk reduction (DRR) is to mitigate the adverse outcomes of natural hazards through enhancing preparedness and minimising vulnerabilities. Despite increasing prevalence of DRR education into school curricula, students' emotional states and ability to reason frequently influence their responsiveness and level of involvement. Developing more effective and student centered disaster education programs demands an understanding of how eco-anxiety influences awareness, motivation, or fear pertaining to DRR and how deductive reasoning facilitates rational decision-making in critical circumstances. Disaster Risk Reduction is a multi-level approach to reducing potential losses by focusing on hazard mitigation, planning, policy-making, and strengthening institutional capacities before disasters occur (Tierney, 2012). DRR involves reducing the exposure and vulnerability of people to hazards, and enhancing their capacity to cope and respond through education, infrastructure planning, and community resilience (Wisner et al., 2004).

The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events (UNDRR, 2009). Disaster Risk Reduction (DRR) is a systematic approach to identifying, assessing, and reducing the risks of disasters by minimising vulnerability and disaster impacts through prevention, mitigation, and preparedness measures (UNISDR, 2009).

2. Background of the Study

In the face of increasing environmental challenges and disasters, disaster risk reduction (DRR) education has become essential for preparing youth to respond effectively. Disaster Risk Reduction is a multi-level approach to reducing potential losses by focusing on hazard mitigation, planning, policy-making, and strengthening institutional capacities before disasters occur (Tierney, 2012). DRR involves reducing the exposure and vulnerability of people to hazards, and enhancing their capacity to cope and respond through education, infrastructure planning, and community resilience (Wisner et al., 2004).

Natural disasters have increased in frequency and severity globally in recent decades, primarily due to climate change and degradation of the environment. A growing sense of environmental worry, often referred to as eco-anxiety, and psychological suffering are becoming common among young people. Eco-anxiety, which was once defined as a continuous concern of an environmental disaster, is now recognised as a strong emotional response to climate change, particularly among young people who are highly conscious of the unknowns that set ahead. Eco-anxiety is a normal and healthy emotion to a world in crisis, not a mental illness (Clayton, S. 2020). Simultaneously, the global emphasis on disaster risk reduction (DRR) has led to the integration of resilience education in school curricula. However, preparedness for disasters requires more than factual knowledge—it demands emotional resilience, critical thinking, and the ability to reason through complex risk scenarios. “Young Adults and children are especially sensitive to the psychological effects of climate change, which can show up as eco-anxiety, helplessness, and fear” (Hickman, C., Marks, E., Pihkala, P., et al. 2021).

Deductive reasoning, a cognitive skill that involves drawing specific conclusions from general principles or known facts, plays a pivotal role in decision-making during emergencies. It allows students to evaluate threats logically, anticipate consequences, and act appropriately under pressure. While both eco-anxiety and deductive reasoning are individually important, little is known about how these two factors interact to influence students' ability to engage in disaster preparedness. Adolescents at the higher secondary level stand at a developmental crossroad where emotions and cognition are highly active and influential. Exploring the relationship between emotional responses (eco-anxiety) and cognitive skills (deductive reasoning) in the context of disaster preparedness offers valuable insights into how students can be better supported through education. Understanding these dynamics can inform the development of more holistic DRR education programs that not only build knowledge but also address emotional well-being and cognitive skills. “Training youth in logical reasoning not only enhances their academic skills but also equips them to handle real-world problems like natural disasters through evidence-based thinking” (Anderson, C. A. 2017). In this context, the present study aims to examine the influence and interrelation of eco-anxiety and deductive reasoning on the disaster risk reduction capabilities of higher secondary school students, with the goal of contributing to more effective, psychologically-informed educational interventions.

Higher secondary school students are particularly susceptible, both emotionally and cognitively, to the impacts of environmental change. Eco-anxiety, a growing psychological response to environmental destruction, may influence students' ability to act rationally in disaster situations. On the other hand, deductive reasoning is also critical since it enables logical thinking and informed decision-making in emergencies. Understanding how eco-anxiety and deductive reasoning interact can offer valuable insights for designing effective disaster risk reduction education that fosters resilience and preparedness in students.

3. Objectives

1. To find out the significant relationship between eco-anxiety on disaster risk reduction of higher secondary school students
2. To find out the significant relationship between deductive reasoning on disaster risk reduction of higher secondary school students.
3. To find out the whether eco-anxiety is a significant predictor of disaster risk reduction of higher secondary school students.
4. To find out the whether deductive reasoning is a significant predictor of disaster risk reduction of higher secondary school students.

4. Methodology

A quantitative research design was employed involving 160 higher secondary school students selected through simple random sampling. A normative survey method was adopted to collect the data. Data were collected using an Eco-Anxiety Scale, a Deductive Reasoning Test, and a Disaster Risk Reduction Scale. The Eco-Anxiety Scale was a three-point Likert scale, measuring students' emotional response to climate change and other environmental issues. The Eco-anxiety scale consists of 30 statements and the dimensions chosen were psychological, social, and ecological. The Deductive Reasoning Test includes three core components such as Syllogism, Inferences, and Critical Thinking, selected based on their relevance to the cognitive maturity and curriculum expectations at the higher secondary level. The tool comprises of 81 objective-type questions designed to assess students' deductive reasoning abilities across these three dimensions. The Disaster Risk Reduction scale is a three-point scale consists of 30 items and the components were Local concern and Health care,

Role of school in disaster risk reduction, Survival skill development and training programme, and Structural construction practices, The role of organizations and society in disaster risk reduction

4.1 Statistical Techniques used for the Study

- Correlation analysis
- Regression analysis

4.2 Delimitation of the study

- The present study was delimited to higher secondary school students in Thiruvananthapuram district.

5. Analysis and Interpretation of the Data Collected

5.1 Descriptive Statistics of Eco-Anxiety, Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students

The descriptive statistics for Eco-Anxiety, Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students are presented in the following table:

Table 1: Descriptive Statistics of Eco-Anxiety, Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students.

Variables	Mean	Standard Deviation	Skewness	Kurtosis
Eco-Anxiety	66.45	9.98	-0.62	-0.38
Deductive Reasoning	59.73	15.42	-0.63	-0.85
Disaster Risk Reduction	67.94	10.03	-0.64	-0.45

From the table presented above, the mean score for Eco-Anxiety is 66.45 with a standard deviation of 9.98, indicating a moderately high level of eco-anxiety among participants with some variability in responses. The negative skewness value of -0.62 suggests that more students reported higher levels of Eco-Anxiety, while the kurtosis value of -0.38 indicates a slightly platykurtic distribution. For Deductive Reasoning, the mean is 59.73, with a relatively high standard deviation of 15.42, showing a wider spread in students' reasoning abilities. The

skewness of -0.63 indicates that a greater number of students scored above the average, and the kurtosis of -0.85 points to a flatter distribution with less clustering of scores around the mean.

In the case of Disaster Risk Reduction, the mean is 67.94 and the standard deviation is 10.03, indicating a generally high level of awareness or competency in Disaster Risk Reduction among students. Like the other variables, Disaster Risk Reduction scores exhibited negative skewness (-0.64), showing a concentration of higher scores, and a kurtosis of -0.45, reflecting a moderately platykurtic distribution.

5.2 Relationship Between Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students

In order to find out the nature of relationship between Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students, the investigator used Karl Pearson's Product Moment Correlation and the details of r , t , SE_r , and level of significance for total sample is given in the table.

Table 2: Relationship between Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students.

Group	N	r	t	SE_r	99% Confidence Interval	
					Upper Level	Lower level
Total	160	-0.70	12.06	0.057	-0.57	-0.80

From the above table coefficient of correlation for total sample is -0.70. The ' r ' lies between the confidence interval -0.57 to -0.80 at 0.01 levels. Hence it is significant at 0.01 levels. The significant ' r ' indicates that there exists a true relationship between the Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students. The magnitude of ' r ' reveals that the relationship between Eco-Anxiety and Disaster Risk Reduction is high and negative. This indicates that the students having high Eco-Anxiety possess low Disaster Risk Reduction.

The obtained Fischer's t -value is 12.06 which is greater than the table value at 0.01 level. Hence it can be considered that there is a significance relationship between the two variables. Therefore, it can be concluded that the relationship exist between the variables is a high negative relationship.

5.3 Scatterplot showing Relationship between Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students

A Scatter Diagram showing the relationship between Eco-Anxiety and Disaster Risk Reduction for total sample is given below.

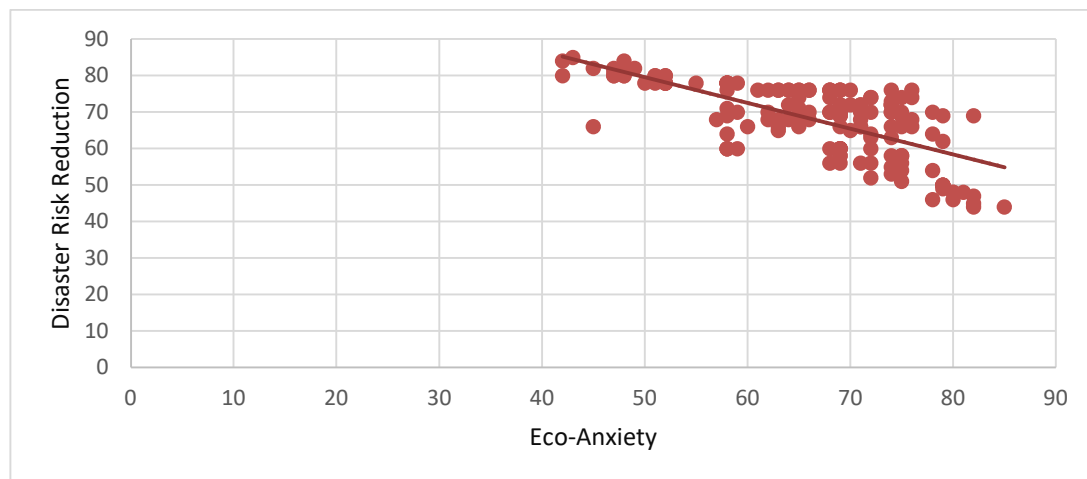


Fig.1 Scatterplot showing between Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students.

In the figure the points are clustered round a line and also the increase in one variable is associated with an increase in the other variable, which shows that there is a direct, negative, and high relationship exists between Eco-Anxiety and Disaster Risk Reduction of Higher Secondary School Students.

5.4 Relationship between Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students

In order to find out the nature of relationship between Deductive Reasoning and Disaster Risk Reduction, the investigator used Karl Pearson's Product Moment Coefficient of Correlation and the details of r , t , SE and level of significance for total sample is given in the table.

Table 3: Relationship between Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students.

Group	N	r	t	SE_r	99%Confience Interval	
					Upper Level	Lower level
Total	160	0.70	12.3	0.037	0.80	0.57

From the above table coefficient of correlation for total sample is 0.62. The ' r ' lies between the confidence interval 0.80-0.57 at 0.01 levels. Hence it is significant at 0.01 levels. The significant ' r ' indicates that there exists true relationship between the Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students. The magnitude of ' r ' reveals that the relationship between Deductive Reasoning and Disaster Risk Reduction is high and positive. This indicates that the students having high Deductive Reasoning possess high Disaster Risk Reduction.

The obtained Fischer's t -value is 12.3 which is greater than the table value at 0.01 level (1.96). Hence it can be considered that there is a significance relationship between the two variables. Therefore, it can be concluded that the relationship exist between the variables is a high positive relationship.

5.5 Scatterplot showing Relationship between Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students

A Scatter Diagram showing the relationship between the variables Deductive Reasoning and Disaster Risk Reduction for total sample is given below.

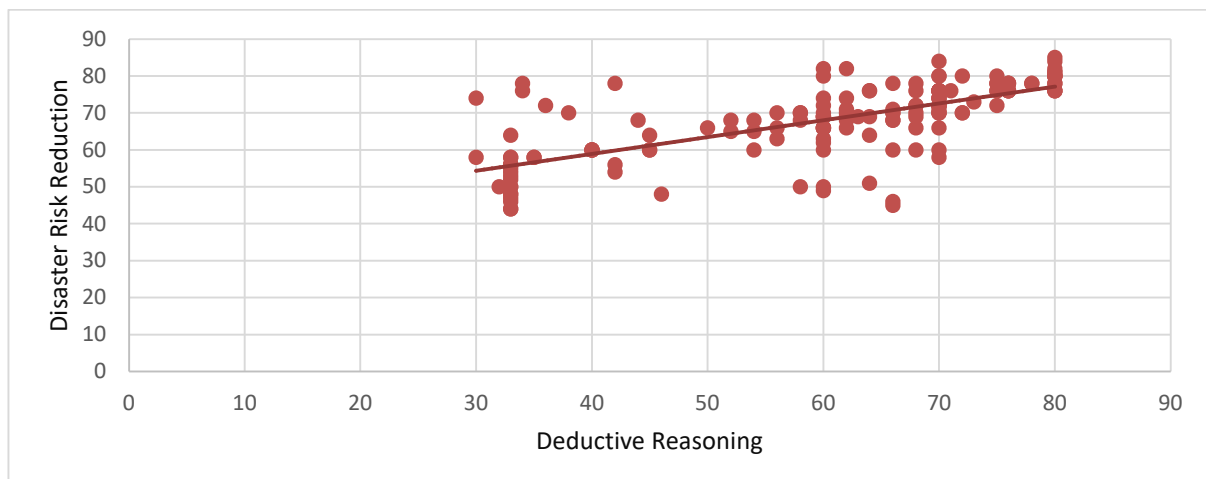


Fig.2 Scatterplot showing Relationship between Deductive Reasoning and Disaster Risk Reduction of Secondary School Students.

In the figure the points are clustered round a line and also the increase in one variable is associated with an increase in the other variable, which shows that there is a direct, positive and high relationship exists between Deductive Reasoning and Disaster Risk Reduction of Higher Secondary School Students.

5.6 Simple Regression Analysis of Predictors of Disaster Risk Reduction of Higher Secondary School Students

To determine whether Eco-Anxiety and Deductive Reasoning are significant predictors of Disaster Risk Reduction of Higher Secondary School Students, the investigator conducted simple regression analysis for each predictor variable and the result of the analysis is summarized below:

Table 4: Summary of Simple Regression Analysis

Predictor Variables	SE	t	p	R	R ²
Eco-Anxiety	0.057	-12.4	< .01	-0.71	0.492
Deductive Reasoning	0.037	12.3	< .01	0.70	0.490

The results of the simple regression analysis indicate that both Eco-Anxiety and Deductive Reasoning are significant predictors of Disaster Risk Reduction of Higher secondary school students. For Eco-Anxiety, the regression analysis yielded a t-value of -12.4, which is statistically significant at 0.01 level. The correlation coefficient (R) is -0.71, indicating a high negative relationship between Eco-Anxiety and Disaster Risk Reduction. The coefficient of determination (R²) is 0.492, suggesting that 49.2% of the variance in students' Disaster Risk Reduction can be explained by their level of Eco-Anxiety. Similarly, the analysis for Deductive Reasoning revealed a significant t-value of 12.3 (at 0.01 level), with a correlation coefficient of 0.70, also indicating a high positive relationship. The R² value of 0.490 shows that 49% of the variance in Disaster Risk Reduction is accounted for by students' Deductive Reasoning. These findings demonstrate that both Eco-Anxiety and Deductive Reasoning are significant variables that contribute meaningfully to students' Disaster Risk Reduction.

6. Findings of the Study

- The study found that higher secondary school students exhibited moderately high levels of eco-anxiety and disaster risk reduction (DRR) awareness, with a wide variation in deductive reasoning ability.
- A significant negative correlation ($r = -0.70$) was observed between eco-anxiety and DRR, indicating that students with higher eco-anxiety tended to have lower disaster preparedness.
- A significant positive correlation ($r = 0.70$) was found between deductive reasoning and DRR, suggesting that students with stronger deductive reasoning ability were more capable of engaging in disaster risk reduction practices.
- Regression analysis revealed that eco-anxiety alone accounted for 49.2% of the variance in DRR scores, while deductive reasoning explained 49%, both statistically significant at the 0.01 level.

7. Educational Implications

- The following has been highlighted that in order to enhance disaster resilience; methods of instruction that lessen eco-anxiety and improve reasoning abilities are required.
- For educators to successfully involve students in disaster risk reduction (DRR), a balanced approach to climate and disaster education is needed, blending rational thought with emotional awareness.
- Schools should prioritise rational thought, problem-solving, and scenario-based learning in science, geography, and environmental studies programs as deductive reasoning has a positive effect on disaster risk reduction.
- Since eco-anxiety has an adverse effect on disaster preparedness, educational programs need to incorporate coping mechanisms and emotional literacy to assist students in constructively regulating their climate-related concerns.
- To allow students cope effectively and confidently in real-life emergencies, disaster education must include both emotional resilience and deductive reasoning beside factual knowledge.
- Educational institution must incorporate emotional regulation and environmental coping strategies in the curriculum because a high level of eco-anxiety correlates lower disaster preparedness.
- School can establish a comprehensive plan that empowers with emotional resilience and cognitive ability for reacting efficiently in dire circumstances, in spite of the knowledge they demand.

8. Conclusion

The study concludes that while eco-anxiety reduces students' ability of disaster risk reduction, deductive reasoning enhances Disaster Risk Reduction effectively. Students with strong deductive reasoning demonstrate better ability to reduce risk of disasters. Thus, while eco-anxiety act as a barrier, the development of deductive reasoning effectively enhances Disaster Risk Reduction. So, integrating critical thinking and emotional support strategies into school curricula is essential to build resilience and disaster readiness among higher secondary school students. both emotional and cognitive factors play a crucial role in disaster preparedness among higher secondary school students.

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Conflict of Interest

There is no conflict of interest to declare for this paper.

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