





Development and Standardisation of a Test on Climate Change Knowledge (CCKT) - Review

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College students can learn about climate change by enrolling in courses, participating in campus climate campaigns and sustainability projects, and taking individual actions like conserving energy and recycling. College students can engage with climate change through educational initiatives, personal sustainable actions, and campus activism. Understanding the science, managing climate-related anxiety, and actively participating in solutions are key components. Climate change refers to the long-term shifts in weather patterns and temperatures, primarily driven by the build-up of greenhouse gases from human activities like burning fossil fuels. Education is crucial in helping young people understand and tackle these consequences. Climate change knowledge is essential for the present generation because they are the inheritors of the crisis and must be equipped to be the agents of change for a sustainable future. Education empowers them to understand the science, adapt to current impacts, and drive the systemic solutions needed to mitigate further harm. By acquiring and applying climate change knowledge, the present generation can shape a more sustainable and secure future for all life on Earth. Knowledge of climate change is crucial for current generations to understand its impacts, prepare for future consequences like natural disasters, and take action to mitigate its effects through personal behavior changes and advocacy. Knowledge of climate change is crucial for present generations as it empowers them to make informed decisions, develop sustainable practices, and drive collective action to mitigate and adapt to a rapidly changing world. This paper gives a clear picture of the development and standardisation of the test on climate change knowledge, enabling the assessment of college students' understanding of climate change. Consequently, the researchers have developed and standardised an instrument to evaluate this knowledge and has achieved success in this initiative.

Keywords: *Climate Change, College Students, Knowledge.*



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1. Introduction

College students can learn about climate change by enrolling in courses, participating in campus climate campaigns and sustainability projects, and taking individual actions like conserving energy and recycling. College students can engage with climate change through educational initiatives, personal sustainable actions, and campus activism. Understanding the science, managing climate-related anxiety, and actively participating in solutions are key components. Climate change refers to the long-term shifts in weather patterns and temperatures, primarily driven by the build-up of greenhouse gases from human activities like burning fossil fuels. Climate change knowledge is essential for the present generation because they are the inheritors of the crisis and must be equipped to be the agents of change for a sustainable future. By acquiring and applying climate change knowledge, the present generation can shape a more sustainable and secure future for all life on Earth. Knowledge of climate change is crucial for current generations to understand its impacts, prepare for future consequences like natural disasters, and take action to mitigate its effects through personal behavior changes and advocacy. Knowledge of climate change is crucial for present generations as it empowers them to make informed decisions, develop sustainable practices, and drive collective action to mitigate and adapt to a rapidly changing world. Knowledge about climate change is essential for the present generation because they will inherit its most severe impacts and need to be equipped with the understanding and skills to mitigate and adapt to the crisis

Why Climate Change Knowledge is Crucial

- **Understanding the Risks:** Climate education provides a scientific understanding of the causes and consequences of climate change. This knowledge is vital for assessing threats and preparing for a changing world.
- **Empowering Action:** By understanding the issues, young people are better equipped to take meaningful action. This can range from personal lifestyle changes to advocating for systemic change, such as supporting climate-focused policies and sustainable business practices.

- **Developing Solutions and Innovation:** The climate crisis demands innovative solutions. Knowledge in science, technology, engineering, and mathematics (STEM), informed by climate literacy, can train and qualify specialists for the "green jobs" that will be created in a low-carbon economy.
- **Fostering Resilience and Adaptation:** Education helps communities and individuals adapt to climate change impacts. It builds the capacity to prepare for and recover from climate-related disasters like floods, droughts, and wildfires, which are increasing in frequency and intensity.
- **Ensuring Food and Water Security:** Knowledge about sustainable agricultural practices, such as drought-tolerant crops and efficient irrigation, is crucial for ensuring food security in a world with disrupted weather patterns.
- **Promoting Health and Well-being:** Climate action has significant public health benefits, such as cleaner air and healthier food systems. An informed generation can advocate for changes that improve overall public health and quality of life.

Providing the present generation with comprehensive climate change knowledge is not merely an educational goal; it is a necessity for building a sustainable, resilient, and liveable future for all. This knowledge empowers individuals to make informed personal and professional choices, advocate for climate-friendly policies, and build a more sustainable future. It also enables people to better cope with current and future climate impacts, such as extreme weather events and resource scarcity.

Climate change knowledge is crucial for the present generation because they will inherit its escalating impacts and must become informed, engaged agents of change. This understanding enables them to make informed decisions, develop sustainable solutions, and advocate for policies that will shape a resilient future for all. Hence the investigators decided to develop and standardise a test on climate change knowledge.

2. LITERATURE REVIEW:

Gina K. Thomas, et al., (2020), studied about a study of Awareness and Attitude of college students towards Environmental pollution. The survey had 22 questions that tested their knowledge, awareness, behaviour and attitude of college students on environmental pollution. The data was statistically analysed by IBM SPSS 20. The study enabled the students to analyse, evaluate and draw inference about issues related to environment. However, the students had high levels of concern, awareness and knowledge about the environmental pollution and understood how harmful human activities are to the environment. But their attitude and behaviour for the betterment of environment is not much promising.

Satyanarayana, D., (2021), studied about a study on Environmental Awareness and Attitude of College Students. In this paper an attempt has been made to study the awareness and attitude of college students towards environment and related issues. To study this phenomena survey method has been used. The study was conducted on 160 students (80 girls and 80 boys). The students were randomly selected from different colleges of Karimnagar district of Telangana. For the purpose of data collection environmental attitude scale and environmental awareness tests were administered on them. The data was collected personally from the colleges. The collected data are tabulated and computed applying simple statistical tools. The status of EE in higher education system is really not satisfactory and there is a need to standardized and upgrade the education system as a whole. The results revealed that both male and female have equal awareness towards environment and female students are having better attitude towards environment than male students.

Tarak Nath Bhunia, and Susanta Kumar Giri, (2025), studied about the study on Environmental Awareness among undergraduate students in Medinipur District, West Bengal. This study examined environmental awareness among undergraduate students in the Medinipur district of West Bengal, focusing on differences based on gender, locality, and academic stream. Using a descriptive survey method, data were collected from 426 students across eight randomly selected government colleges using a standardized Environmental Awareness Scale developed by the researcher. The analysis employed independent

samples t-tests and Welch's ANOVA with Games-Howell post hoc tests. Findings revealed that girls had significantly higher environmental awareness than boys, and science students outperformed their arts and commerce counterparts. However, no significant difference was found between rural and urban students.

3. Methodology

3.1. Sample:

Random sampling technique has been used in the process of data collection from the sample of 100 college students.

3.2. Method of the Study:

Normative survey method has been used in the present study.

3.3. Tool:

As there is no proper tool available to measure climate change knowledge of the college students, the investigators, according to the present situation decided to develop and standardise a tool namely Climate Change Knowledge Test (CCKT) in order to realize their objective. In order to develop and standardise the test, the investigators collected variety of information regarding the climate change knowledge required for the college students from the experts, teachers handling science subject and from other web resources. Keeping the collected information into consideration the researchers developed 45 multiple choice questions which constitutes the Climate Change Knowledge Test for pilot study. The maximum mark for a question is 1 and the minimum mark is 0. Therefore, one can get a maximum score of '45' and a minimum score of '0' for this test. Copies of this test were distributed to 100 college students studying in the Arts and Science colleges situated in Cuddaloredistrict of Tamilnadu, India. For all the items (45), after scoring each paper, the correction for chance success was made using the following formula developed by **Lindman (1971)**.

$$CS = R - \frac{W}{N - 1}$$

Where,

- CS - Corrected score
- R - Right answer (response)
- W - Wrong answer (response),

and

N - Number of distracters (alternatives).

The climate change knowledge test scores for all the 100 subjects were arranged in the descending order from the top-most scorer to the bottom-most scorer. Then they were subjected to item analysis. Item analysis is an important step in the validation of any test. The two criterion groups - the upper group consisting of 27 papers (top 27%) and the lower group of 27 papers (bottom 27%) were formed.

“The difficulty of an item may be defined as the proportion of the examinees that marked the item correctly. The level of difficulty is indicated by a numerical term, the difficulty index (Remmers *et al.*, 1967). Arbitrarily the difficulty of an item may be given by a panel of experts. But there is a standard and dependable method for it. “The difficulty index of each item is found by averaging the percents correct in the upper and lower groups. This percentage is approximate but is accurate enough for most purposes and has the great advantage of easy computation” (Garrett, 1979). The investigator followed the procedure outlined by Ebel (1966) in computing the indices of item difficulty and discrimination. “Individuals are discriminated when they obtain different scores and are not discriminated when they obtain identical scores” (Guilford, 1954).

In the present investigation, the upper group has 27 papers (27%) and the lower group has 27 papers (27%). For each item, the counts from the upper and lower groups to the correct response were added and then divided by the sum of the number of papers in the upper and the lower groups. The resultant decimal fraction was multiplied by 100 in order to express the quotient in percentage.

$$\text{Index of difficulty} = \frac{RU}{NU} + \frac{RL}{NL} \times 100$$

Where,

RU = Right response in the upper group

RL = Right response in the lower group

NU = Number of subjects in the upper group

NL = Number of subjects in the lower group

The measure of item difficulty is an inverse measure. The higher the numerical value of this index of difficulty, the easier the item. In order to find out the index of discrimination for an item, the total number who gave the correct response for that item in the lower group was subtracted from the total number who gave the correct response for that item in the upper group and this difference was divided by the number of subjects either in the upper group or lower group and the quotient expressed as a decimal fraction is the index of discrimination.

$$\text{Index of discrimination} = \frac{UR - LR}{NU \text{ (or) } NL}$$

Where,

UR = correct responses in the upper group

LR = correct responses in the lower group

NU (or) NL = number of subjects in the upper group or lower group

The index of difficulty and the index of discrimination for all the 45 items in the Climate Change Knowledge Test for the college students administered for the purpose of pilot study were thus computed (Vide: Table-1).

Table -1: Item Analysis
Indices of Item Difficulty and Discrimination for Test on Climate Change Knowledge

Si. No	Index Of Item Difficulty	Index Of Discrimination	Item Selected
1	81.48148148	0.592592593	SELECTED
2	81.48148148	0.518518519	SELECTED
3	66.66666667	0.37037037	SELECTED
4	70.37037037	0.481481481	SELECTED

5	133.3333333	0.37037037	NOT SELECTED
6	66.66666667	0.444444444	SELECTED
7	81.48148148	0.518518519	SELECTED
8	81.48148148	0.592592593	SELECTED
9	77.77777778	0.333333333	SELECTED
10	81.48148148	0.592592593	SELECTED
11	66.66666667	0.37037037	SELECTED
12	81.48148148	0.444444444	SELECTED
13	111.1111111	0.444444444	NOT SELECTED
14	81.48148148	0.518518519	SELECTED
15	103.7037037	0.592592593	NOT SELECTED
16	122.2222222	0.407407407	NOT SELECTED
17	62.96296296	0.333333333	SELECTED
18	62.96296296	0.259259259	NOT SELECTED
19	81.48148148	0.518518519	SELECTED
20	14.81481481	-0.148148148	NOT SELECTED
21	62.96296296	0.407407407	SELECTED
22	88.88888889	0.444444444	SELECTED
23	77.77777778	0.333333333	SELECTED
24	81.48148148	0.222222222	NOT SELECTED
25	133.3333333	0.37037037	NOT SELECTED
26	66.66666667	0.444444444	SELECTED
27	81.48148148	0.518518519	SELECTED
28	74.07407407	0.444444444	SELECTED
29	55.55555556	0.407407407	SELECTED
30	88.88888889	0.444444444	SELECTED
31	48.14814815	-0.259259259	NOT SELECTED
32	74.07407407	0.666666667	SELECTED
33	81.48148148	0.592592593	SELECTED
34	70.37037037	0.407407407	SELECTED
35	77.77777778	0.62962963	SELECTED
36	70.37037037	0.333333333	SELECTED
37	77.77777778	0.333333333	SELECTED
38	81.48148148	0.666666667	SELECTED
39	137.037037	0.481481481	NOT SELECTED
40	88.88888889	0.074074074	NOT SELECTED
41	114.8148148	0.62962963	NOT SELECTED
42	74.07407407	0.518518519	SELECTED
43	81.48148148	0.518518519	SELECTED
44	103.7037037	0.518518519	NOT SELECTED
45	62.96296296	0.333333333	SELECTED

Any item whose difficulty index is lower than 10% (or) higher than 90% should be considered as worthless for measurement (Remmers *et al.*, 1967). Any item whose index of discrimination is above 0.30 should be considered as reasonably good item (Ebel, 1966). In the present study, only such of those items having the difficulty indices range from 30% to 90% and

whose indices of discrimination ranging from **0.30 to 0.80** were selected. Thus 13 items were deleted on the above principle and only 32 items were retained in the final form of the Climate Change Knowledge Test, (Vide: Table -1). The final form of the test contains 32 multiple choice items for 32 marks and needs 40 minutes for a student to answer.

Table-2: The levels of the Test on Climate Change Knowledge has been given below

Levels	Scoring Range
Low level Climate Change Knowledge	0 - 8
Average level Climate Change Knowledge	9 - 24
High level Climate Change Knowledge	25 - 32

4. The Reliability and the Validity

The Climate Change Knowledge Test has construct validity as the items were selected following rigid item analysis procedure described above. The reliability of the test has been found to be 0.81 using the test-retest method. Its validity was found to be 0.90. Thus, the climate change knowledge test has validity and reliability.

5. Conclusion

The tool namely Climate Change Knowledge Test hence developed and standardized according to the prescribed norms and contributed to the field of education.

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