Construction Of An Environmental Awareness Scale For Prospective Teachers

Abstract

The environmental concern is growing today at greater speed in developing, developed and underdeveloped countries because the consequences of environmental damages has become so apparent and horrifying. Besides destructive trend on environment, sluggish improvement on the environmental awareness and initiatives revealed bitter consequences of the environment. The emphasis should be on teaching people how to think, rather than what to think. Environmental Awareness not only implies knowledge about environment but also attitude, values and necessary skills to solve environment related problems. People need to learn ways to perceive environmental problems. It is very essential for each individual to develop an awareness of protection and preservation towards environment. It is imperative that humans implement new ways of thinking and change their current ways of living due to the irreversible effects of environmental degradation. It is only the knowledge and understanding that can do this. Prospective teachers not only study this for themselves but can spread the knowledge and understanding to students they will meet in future. A lot of research tools are available to measure environmental awareness of students and teachers but almost no reference was available to measure environmental awareness of Prospective Teachers. So, it was decided to construct an Environmental Awareness Scale for Prospective Teachers. The questionnaire was designed specifically for this study, keeping in mind the fact that environmental degradation is not a prominent environmental issue for people in India, as compared to developed countries. A particular interest was emphasized while constructing this questionnaire so that an understanding of what the prospective teachers have been doing in terms of raising awareness of chemicals and their hazardous nature and to understand their future plans on environmental and chemical awareness. This questionnaire was aimed at uncovering the knowledge and conceptions of prospective teachers i.e. B.Ed. students about the environment and other issues relating to the environment. This tool will help to find out environmental literacy and environmental awareness index of Prospective Teachers.
1. Introduction

The environmental concern is growing today at greater speed in developing, developed and underdeveloped countries because the consequences of environmental damages has become so apparent and horrifying. While there is consensus about the severity of environmental degradation taking place worldwide, there is little consensus about what can, and should be done to avert future environmental catastrophe. Educating the public and creating public awareness is a necessity for the success of the environment. Environmental educators need to keep the proper hat on their heads when doing environmental education programs. Population explosion, Urbanization, Clear-cutting of forests, depletion of the ozone layer, erosion of the soil, pollution of water resources, accelerated rate of extinction of species, destruction of varieties of ecosystems and global warming are few examples of environmental degradation. Besides destructive trend on environment, sluggish improvement on the environmental awareness and initiatives revealed bitter consequences of the environment. Knowledge by environmental education was started globally as an effort to protect the environment and sustainable development (Moroye 2005) when it was observed to have the potential to manage life and to establish a prosperous and peaceful future. In 2004-05, realizing the importance of sustainable development, Hon’ble Supreme Court of India directed to Indian Government to introduce mandatory study of Environmental Studies in all schools and colleges. While there is consensus about the severity of environmental degradation taking place worldwide, there is little consensus about what can, and should be done to avert future environmental catastrophe. Today, unfortunately, we are dealing with many of the environmental tragedies predicted decades ago.

Educating the public and creating public awareness is a necessity for the success of the environment. Environmental educators need to keep the proper hat on their heads when doing environmental education programs. The emphasis should be on teaching people how to think, rather than what to think. One of the best ways to help our environment was to educate people to be environmentally conscious as well as environmentally considerate. Since a low level of awareness about environmental degradation in developing countries is one of the impediments to environmental degradation mitigation, it is necessary to promote and facilitate education, training,
and awareness programs in such countries. India’s environmental problems have been attributed to lack of political commitment, lack of a comprehensive environmental policy, poor environmental awareness, functional fragmentation of the public administration system, and prevalence of poverty (Bowonder 1986). Understanding global environmental issues and taking action to confront them are challenges that need to be addressed not only by educators but also by planners, economists, policy makers, natural and social scientists, and the general public.

2. Description

Environmental literacy includes high intrinsic values concerning the environment and its effects on the human life (Taraban et al. 2007). Environmental Awareness not only implies knowledge about environment but also attitude, values and necessary skills to solve environment related problems. On the basis of the following table-1, Environmental Awareness and Literacy of the prospective teachers i.e. B.Ed. students can be shown:

Table 1: Environmental Awareness and Literacy Index

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Environmental Awareness Literacy Score</th>
<th>Environmental Awareness Literacy Level</th>
<th>Broad Level Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>More than 4.50</td>
<td>Excellent</td>
<td>High</td>
</tr>
<tr>
<td>2</td>
<td>From 4.00 to 4.49</td>
<td>Very Good</td>
<td>Moderate</td>
</tr>
<tr>
<td>3</td>
<td>From 3.50 to 3.99</td>
<td>Good</td>
<td>Moderate</td>
</tr>
<tr>
<td>4</td>
<td>From 3.00 to 3.49</td>
<td>Satisfactory</td>
<td>Low</td>
</tr>
<tr>
<td>5</td>
<td>From 2.50 to 2.99</td>
<td>Average</td>
<td>Low</td>
</tr>
<tr>
<td>6</td>
<td>From 2.00 to 2.49</td>
<td>Unsatisfactory</td>
<td>Needs Special Care</td>
</tr>
<tr>
<td>7</td>
<td>Less than 2.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Literature Search

Environmental literacy consists of five elements namely, knowledge, attitude, behavior, awareness and environmental involvement (Negev et al. 2008; Erdogan et al. 2009; McBeeth and Volk 2010). In making decision toward country development, students should acquire a consistent and high level of environmental literacy. However, based on previous research, the level of environmental literacy amongst students in Australia, the United States, China, Singapore and New Zealand is still unsatisfactory (Jannah et al. 2013). Thus, in order to achieve a higher level of environmental literacy amongst the students, it is necessary to implement effective environmental lessons and teachers play a crucially important role to attain this aim (Goodnough and Hung 2008; Habibah and Punitha 2010). Effective teachers are those who possess the relevant content knowledge (Henze et al. 2008), attitude towards the environment and a deep pedagogical knowledge as well as able to teach effectively (Rosilawati and Zainon 2009).

4. Context Of The Study And The Statement

It is very essential for each individual to develop an awareness of protection and preservation towards environment. People need to learn ways to perceive environmental problems. Thote et al. (2007) found that knowledge, attitude-behavior model describe that increase in knowledge will change in attitude which will in turn influence behavior. Education is a fundamental means to bring any desired change in society. Teachers are the most crucial factors in any educational system or society and one of the goals of the teacher education is to provide teachers with the intellectual and professional background adequate for their assignments to changing situation. A lot of research
tools are available to measure environmental awareness of students and teachers but almost no reference was available to measure environmental awareness of Prospective Teachers. So, it was decided to construct an Environmental Awareness Scale for Prospective Teachers.

5. Objectives Of The Present Research

It is imperative that humans implement new ways of thinking and change their current ways of living due to the irreversible effects of environmental degradation. It is only the knowledge and understanding that can do this. Prospective teachers not only study this for themselves but can spread the knowledge and understanding to students they will meet in future. This scale can have following objectives:

i. Qualitative analysis of environmental awareness and interests of prospective teachers.
ii. Quantitative analysis of levels of environmental awareness and environment related behaviour of prospective teachers.
iii. Developing understanding for the environmental problems and critical thinking and problem-solving skills.

6. Questionnaire Design

The questionnaire was designed specifically for this study, keeping in mind the fact that environmental degradation is not a prominent environmental issue for people in India, as compared to developed countries. Use of terminology such as recycling bins, insulated homes, hybrid cars, and energy efficient homes was avoided based on the assumption that people in a developing country like India are not yet familiar with such environmentally friendly practices and products. They do not have a clear understanding of the causes and impacts of the environmental issues and what they can do to mitigate global warming. The text of a questionnaire is in many ways similar to the source code of a program. After deciding about the general setup of a questionnaire, attention is paid to formulating the questions. After drafting the English version, it was translated into Hindi for easy understanding of students, especially for rural or English halting students. A total of 80 questions were selected to be included in the questionnaire. For selection and grouping of questions, cooperation and assistance from B.Ed. students was asked. The questionnaire was subjected to expert validation, commented on the wording and content. The experts were requested to give their opinion and suggestion regarding the tools. They were requested to check for relevance, simplicity, content validity and language of the tool. Appropriate modifications were made as per the suggestions of the experts and the number of questions in the questionnaire was summed up to 50 for easy and understandable difficulties of the students like time and availability.

The questionnaire includes 50 close-ended structured questions covering various aspects of the general and current environmental knowledge, pollution and interests at global and local levels. The questionnaire is divided into six sections to study knowledge of and about environment, attitude toward the environment, environmental behavior, awareness of environmental issue, involvement in environmental activities and way to increase awareness, besides some demographic data. The second and third sections constitute the main part of the questionnaire and are used to measure the level of knowledge about environmentally related topics.

7. Contents Of The Scale

In the present environmental awareness scale following type of contents is covered:
i. Orientation questions to find general awareness about environment.
ii. Multiple choice questions to measure the knowledge content.
iii. Multiple choice questions to judge environment understanding and behavior.
iv. Individual related questions to measure attitude and concern.
v. Agreement questions to find involvement in environmental activities.
vi. Questions to assess teaching skills and ways to increase environmental awareness.

8. Blue Print Of The Questionnaire

Blue print can help investigator to decide the number and type of questions, its simplicity and experts’ opinions. It helps to compare properties of scale on the basis of objectives. Blue print (Table-2 and Table-3) shares the information how the score can be calculated to know the environmental literacy. Depending upon the significance of questions with reference to environmental issues, different questions are rated accordingly. Environmental score can be calculated using the questionnaire.

Table 2: Blue Print and Question Nos. of Environmental Awareness Scale for Prospective Teachers

<table>
<thead>
<tr>
<th>Section</th>
<th>Type</th>
<th>Question Nos. of Environmental Awareness Scale</th>
<th>Total Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Orientation</td>
<td>1, 5, 10, 3, 2, 6, 8, 3, 9, 2, 4, 7, 2</td>
<td>10</td>
</tr>
<tr>
<td>B</td>
<td>Knowledge</td>
<td>15 - 25, 15, 0, 0, 0, 0, 15</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Understanding</td>
<td>--, 0, 26-30, 5, --, 0, 0</td>
<td>05</td>
</tr>
<tr>
<td>D</td>
<td>Attitude</td>
<td>--, 0, 0, 31 - 40, 5, 31 - 40, 5, 10</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Agreement</td>
<td>41, 1, 42, 45, 2, 43, 1, 44, 1</td>
<td>05</td>
</tr>
<tr>
<td>F</td>
<td>Methodology</td>
<td>--, 0, 0, 46 - 50, 5, 0</td>
<td>05</td>
</tr>
<tr>
<td>Total Questions</td>
<td></td>
<td>19, 10, 08, 13, 50</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Weightage/Score for the Responses Opted by Prospective Teachers

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Response Opted</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3, 4, 5, 6, 9, 10, 28, 29, 30, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50</td>
<td>1, 2, 3, 4, 5</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7, 8, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40</td>
<td>1, 2, 3, 4, 5</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>26</td>
<td>1, 2, 3, 4, 5</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>27</td>
<td>1, 2, 3, 4, 5</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>11 – 25</td>
<td>Correct (5), Wrong (0), DoNotKnow (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Directions Regarding The Awareness Scale

Prospective teachers are to tick correct or desirable responses on 5-point (1 - 5) Likert type scale. Section B and C include multiple choice questions while section A, D, E and F include questions on agreement or concern nature.
10. Validity And Reliability

Validity refers to the credibility or believability of the research and reliability refers to the repeatability of findings. Items on the questionnaire must measure something and a good questionnaire measures what one designed it to measure. Validity is a difficult thing to assess. There is always the chance that another unknown factor contributed to the results and findings. Being reliable refers to the consistency of the research and the extent to which it can be replicable. The idea behind reliability is that any significant results must be more than a one-off finding and be inherently repeatable. Validity and reliability of the instrument was testing by the following methods:

i.) Content Validity

Content validity (also known as logical validity) refers to the extent to which a measure represents all facets of a given social construct. Content validity deals with whether the assessment content and composition are appropriate, given what is being measured. Before the questionnaire was administered to actual participants, a group of five experts reviewed the assessment and compare the questions included on the assessment against a blueprint. The experts studied different sections and questions included in the questionnaire and rated the assessment from 90 to 100% indicating the appropriateness of the assessment.

ii.) Face Validation

Face validation in a sense is a form of common sense applied to a questionnaire's purpose. Researchers employing face validation on their questionnaire need only look at the questionnaire as a whole and its individual items and ask themselves, "Does this measure what it should?" For this method of validation, no quantitative methods are needed. The questionnaire used in this study serve the purpose for which this was constructed.

iii.) Internal Validity

It refers to how well the experiment is free of outside influence that could taint its results. Any research instrument that takes students’ grades into account but not their developmental age is not a valid determinant of intelligence. In the present study, the questionnaire was specifically designed to assess the environmental awareness of prospective teachers i.e. B.Ed. students and they are expected to be in the age range of 18 to 28 with a mean of 22 to 23 years. The entry qualification for B.Ed. course is either graduation or post-graduation, score of which is higher. As per directions of Hon’ble Supreme Court of India, it is mandatory for all the students to qualify environmental studies in any year of their graduation, failing this, degree is not awarded. So, the students, studying B.Ed. course, are assumed to be knowledgeable about environmental crisis and issues. The age students like to be trained as a teacher, is neither adolescent nor matured. This is the age when one may acquire and digest the information for better environment.

iv.) Construct Validity

Construct validation refers to observing all the specific items on the questionnaire to determine whether the questionnaire addresses the topic overall. This type of validation is often the most important validation in developing new questionnaires. Typically, the researchers create a list of all that the questionnaire is meant to measure and check the items on the questionnaire against this list. This allows the researchers to ensure that every item corresponds to a desired measurement and that everything that should be measured is actually measured. A total of 40 B.Ed. students of Government College of education, Bhiwani were chosen randomly to find this validity. Out of this
20 students were instructed about environmental crisis and issues for a week and other were given no instructions. Following table-4 shows the Mean Response, Standard Deviation and Pearson Correlation.

<table>
<thead>
<tr>
<th>Section</th>
<th>Mean Response</th>
<th>Standard Deviation</th>
<th>Mean Response</th>
<th>Standard Deviation</th>
<th>Difference in Mean Response</th>
<th>Pearson Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>1.78</td>
<td>0.55435</td>
<td>2.00</td>
<td>0.60302</td>
<td>0.22</td>
<td>0.98899</td>
</tr>
<tr>
<td>Knowledge</td>
<td>2.75</td>
<td>3.13</td>
<td>0.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>1.80</td>
<td>2.20</td>
<td>0.40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A construct is the behavior or outcome a researcher seeks to measure within a study, often revealed by the independent variable. In the present study, Environmental awareness Score was measured by using questionnaire and also one can know the lacuna, one have regarding environment conservation information.

v.) External Validity

It refers to how well the study reflects the real world and not just an artificial situation. Although the prescribed instrument is specifically designed for prospective teachers i.e. B.Ed. students but it can be applied to teachers and students of secondary, senior secondary, college and university level. It is considered that teaching-learning concept is always present, at different levels, in all type of persons of any society. Any person is in the state of constant learning every time. All persons ask to other ones for understanding of any concept. Because of that, this questionnaire is supposed to have general applicability to all the sections of the society and to different persons of different age. This questionnaire has applicability to a diverse group of people and a wide array of natural environments.

vi.) Predictive Validation

This form of validation ensures the accuracy of the questionnaire by detecting whether subjects' answers on the questionnaire can predict certain aspects or behaviors of the subjects. In the present study, B.Ed. students can be assessed the Environmental Literacy they have. The score these respondents achieve can predict the place any respondent may have on the basis of Broad Level Indicator and Environmental Awareness Literacy Level. Thus, this index helps persons to see their awareness and percept to do better for better environment.

vii.) Concurrent Validation

Concurrent validity is a type of evidence that can be gathered to defend the use of a test for predicting other outcomes. Concurrent validity applies to validation studies in which the two measures are administered at approximately the same time. Researchers tend to use concurrent validation for a questionnaire when there are other questionnaires or similar measures that investigate the same aspect of interest as the questionnaire in development. Concurrent validity is demonstrated when a test correlates well with a measure that has previously been validated. The two measures may be for the same construct, but more often used for different, but presumably related, constructs. As this questionnaire is based on “Pedagogical Environmental Theory” and no such type of questionnaire was available, concurrent validation was not feasible.
11. Test-Retest Reliability

Administering the same test to the same sample on two different occasions estimates test-retest reliability. This approach assumes that there is no substantial change in the construct being measured between the two occasions. The amount of time allowed between measures is critical. In the present study, the test was administered in the last week of January 2015 and retest was administered in the last week of February 2015 to 60 B.Ed. students of Government College of Education, Bhiwani. Pearson’s correlation coefficient was calculated on the scores of the participants as given in the table-5:

Table-5: Correlation of Mean Scores of Students in the Test and Re-test

<table>
<thead>
<tr>
<th>Section</th>
<th>Test Mean Score</th>
<th>Standard Deviation</th>
<th>Pearson Correlation</th>
<th>Coefficient of Determination (R-squared)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>4.18</td>
<td>0.56338</td>
<td>4.34</td>
<td>0.94917</td>
</tr>
<tr>
<td>Knowledge</td>
<td>2.80</td>
<td></td>
<td>2.91</td>
<td></td>
</tr>
<tr>
<td>Understanding</td>
<td>3.98</td>
<td></td>
<td>4.32</td>
<td></td>
</tr>
<tr>
<td>Concern</td>
<td>4.01</td>
<td></td>
<td>4.21</td>
<td></td>
</tr>
<tr>
<td>Reliability</td>
<td>4.30</td>
<td></td>
<td>4.13</td>
<td></td>
</tr>
<tr>
<td>Teaching Skills</td>
<td>4.25</td>
<td></td>
<td>4.23</td>
<td></td>
</tr>
</tbody>
</table>

Pearson correlation coefficient value 0.94917 indicates that this assessment is reliable. The assessments or questionnaires with values above 0.70 are considered to be reliable. The coefficient of determination is a number that indicates how well data fit a statistical model. It is a statistic used in the context where main purpose is either the prediction of future outcomes or the testing of hypotheses, on the basis of other related information. It provides a measure of how well observed outcomes are replicated by the model. The coefficient of determination at 0.900914 indicates the high reliability of the tool.

11.1 Split-Half Reliability

This is a measure of reliability in which a test is split into two parts and an individual’s scores on both halves are compared. If the test is consistent it leads the experimenter to believe that it is most likely measuring the same thing. This is not to be confused with validity where the experimenter is interested if the test measures what it is supposed to measure. In split-half reliability, all items are randomly divided that purport to measure the same construct into two sets. The entire instrument is administered to a sample of people and calculated the total score for each randomly divided half. The split-half reliability estimate is simply the correlation between these two total scores.

Table-6: Split-Half Reliability (Section Half)

<table>
<thead>
<tr>
<th>Section-I</th>
<th>Section-II</th>
<th>Pearson Correlation</th>
<th>Spearman-Brown Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>Concern</td>
<td>4.21</td>
<td>0.05292</td>
</tr>
<tr>
<td>Knowledge</td>
<td>Reliability</td>
<td>4.13</td>
<td>0.05292</td>
</tr>
<tr>
<td>Understanding</td>
<td>Teaching Skills</td>
<td>4.23</td>
<td>0.05292</td>
</tr>
</tbody>
</table>
In the present study, the six sections of the questionnaire were divided into three each with Orientation, Knowledge and Understanding in Section-I and Concern, Reliability and Teaching Skills in Section-II and correlated (Table-6). The Pearson correlation was found to be 0.97960.

One problem with the split-half reliability coefficient is that since only half the number of items is used, the reliability coefficient is reduced. To get a better estimate of the reliability of the full test, the Spearman-Brown correction can be applied, namely:

$$\rho = \frac{2r}{1+r} = 0.98970$$

This result shows that the test is quite reliable.

Split-half can also be studied by considering and dividing the data into other type of half depending upon attitude and applications because these two traits are very important to study environmental awareness.

**Table-7: Split-Half Reliability (Attitude Sections)**

<table>
<thead>
<tr>
<th>Section</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>Pearson Correlation</th>
<th>Spearman-Brown Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>4.34</td>
<td>0.01414</td>
<td>Concern</td>
<td>4.21</td>
<td>0.05657</td>
<td>1</td>
</tr>
<tr>
<td>Understanding</td>
<td>4.32</td>
<td></td>
<td>Reliability</td>
<td>4.13</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

In this, sections related attitude were considered. Section-I includes Orientation and Understanding and Section-II includes Concern and Reliability and correlated (Table-7). The Pearson correlation was found to be 1 which indicates high reliability. Spearman-Brown Correction was found to be 1 which indicates that the test is quite reliable.

**Table-8: Split-Half Reliability (Applications Sections)**

<table>
<thead>
<tr>
<th>Section</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
<th>Pearson Correlation</th>
<th>Spearman-Brown Correction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>4.34</td>
<td>0.09192</td>
<td>Understanding</td>
<td>4.32</td>
<td>0.13435</td>
<td>1</td>
</tr>
<tr>
<td>Concern</td>
<td>4.21</td>
<td></td>
<td>Reliability</td>
<td>4.13</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

In this, sections related applications were considered. Section-I includes Orientation and Concern and Section-II includes Understanding and Reliability and correlated (Table-8). The Pearson correlation was found to be 1 which indicates high reliability. Spearman-Brown Correction was found to be 1 which indicates that the test is quite reliable.

**11.2 Internal Consistency Reliability**

In internal consistency reliability estimation one use single measurement instrument administered to a group of people on one occasion to estimate reliability. In effect one judge the reliability of the instrument by estimating how well the items that reflect the same construct yield similar results. Internal consistency reliability estimation is how consistent the results are for different items for the same construct within the measure.

The (Kuder and Richardson Formula 20) test checks the internal consistency of measurements with dichotomous choices. It is equivalent to performing the split half methodology on all combinations of questions. In the present study, all participants scoring five and four credits
are considered to answer correctly and all other answers were treated as wrong. The test statistic (Source: http://www.real-statistics.com/reliability/kuder-richardson-formula-20) is:

\[ \rho_{KR20} = \frac{k}{k-1} \left(1 - \frac{\sum_{j=1}^{k} p_j q_j}{\sigma^2}\right) \]

where
\[ k = \text{number of questions}, \]
\[ p = \text{number of people answered correctly divided by total number of people answered} \]
\[ q = \text{number of people answered incorrectly divided by total number of people answered} \]
\[ \sigma^2 = \text{variance of the total scores of all the people individually answered correctly} \]

Values range from 0 to 1. A high value indicates reliability.

In the present study, the value \( \rho_{KR20} = 0.714 \) shows that the test has high reliability.

Cronbach’s alpha is superior to Kuder and Richardson Formula 20 since it can be used with continuous and non-dichotomous data. In particular, it can be used for testing with partial credit and for questionnaires using a Likert scale. One problem with the split-half method is that the reliability estimate obtained using any random split of the items is likely to differ from that obtained using another. One solution to this problem is to compute the Spearman-Brown corrected split-half reliability coefficient for every one of the possible split-halves and then find the mean of those coefficients. This is the motivation for Cronbach’s alpha. Cronbach’s alpha (Source: http://www.real-statistics.com/reliability/cronbachs-alpha) is defined to be:

\[ \frac{k}{k-1} \left(\frac{\sum_{j=1}^{k} \text{cov}(x_j, x_0)}{\text{var}(x_0)}\right) = \frac{k}{k-1} \left(1 - \frac{\sum_{j=1}^{k} \text{var}(x_j)}{\text{var}(x_0)}\right) \]

where variable \( x_1, \ldots, x_k \) and \( x_0 = \sum_{j=1}^{k} x_j \)

Values range from 0 to 1. A high value indicates reliability.

In the present study, the value, \( \alpha = 0.729 \) shows that the test has high reliability.

Reliability theory predicts that true reliability cannot be calculated but it can only be estimated. Each of the reliability and validity estimators give a different value for reliability and validity. Cronbach's Alpha tends to be a high estimate of reliability. The test-retest reliability tends to be a lower-bound estimate of reliability. When analyzing data, it is safest to do two analyses, one with an upper-bound estimate of reliability and one with a lower-bound one. If one find a significant treatment effect estimate with both, one can be fairly confident that one would have found a significant effect in data that had no pretest measurement error.

12. Discussion

Education should produce the flexible, adaptable, tolerant mind which can think rationally and critically, see several points of view and realise that there is no one ideal way of life (Geen 2006; Geen et al. 2007). A particular interest was emphasized while constructing this questionnaire so that an understanding of what the prospective teachers have been doing in terms of raising awareness of chemicals and their hazardous nature and to understand their future plans on environmental and chemical awareness.

13. Demographic Profile

When designing a survey, the researcher needs to assess who to survey and how to breakdown overall survey response data into meaningful groups of respondents. Deciding who to survey is based on the main topic of the survey itself. Once the survey data is collected, the data can be divided into various data groups based on demographic information gathered from the survey. To collect meaningful data from respondents, it may be tempting to ask many demographic
questions. However, asking too many questions can backfire. Some respondents may become concerned or aggravated by having to answer a large number of demographic questions. Additionally, they may feel that they will compromise their confidentiality, and others may perceive the questions as an invasion of privacy. Choosing the proper demographic questions will truly give the actionable and meaningful results to assist in making better research decisions. Demographics are characteristics of a population. Characteristics such as Name, Age, Gender, Location of college of education, Teaching experience, Type of education, Category of education, Location of college, Father’s occupation, Educational level of parents and Location of residence are all typical types of demographics that are used in the present survey.

14. Perspectives of B.Ed. Students on Environmental Issues

Questionnaire examines the exposure of the respondents to environmental issues and the sources of information. It aims to identify possible factors and the significance of formal and informal channels of environmental knowledge. The information was collected on 5-point Likert scale (1-5) with one response as Do Not Know. This response was added to help respondents to respond honestly and accurately. If respondents do not know or do not like to share their view, they were not forced to answer but can choose the response Do Not Know. The questionnaire possesses content validity because statements were selected based on unanimity of experts on content accuracy, conceptualization and distribution of statements over different dimensions. There are 50 questions in all divided in six blocks as detailed below:

- **Block-A (Orientation Questions):** It comprised 10 questions to assess B.Ed. students’ information about environment, their sources of information and what they think, others know about environment. Information was asked on Likert 5 point scale i.e. Strongly Agree -1, Agree - 2, Disagree - 3, Strongly Disagree - 4 and Do Not Know - 5. The objective behind this information is to know how students feel about the environment.

- **Block-B (Multiple Choice Questions):** It comprised 15 questions to measure B.Ed. students’ knowledge about the environment. Information was asked on Likert 5 point scale i.e. 4 possible and do not know responses. The objective behind this information is to know how much knowledge about environment and its degradation is possessed by students.

- **Block-C (Multiple Choice Understanding Questions):** It comprised 5 questions to assess B.Ed. students’ understanding about the environmental issues and problems. Information was asked on Likert 5 point scale i.e. 4 possible and do not know responses. The objective behind this information is to know about the application of knowledge students’ possess. This will tell how students evaluate environmental problems for themselves and for others.

- **Block-D (Individual Related Questions):** It comprised 10 questions to measure attitude or value, B.Ed. students possess regarding environmental issues and problems. Information was asked on Likert 5 point scale i.e. Totally Not Concerned - 1, Somewhat Unconcerned - 2, Somewhat Concerned - 3, Totally Concerned - 4, and Do Not Know - 5. The objective behind this information is to measure attitude or the value students possess regarding environmental issues and problems.

- **Block-E (Reliability Questions):** It comprised 5 questions to measure reliability B.Ed. students possess regarding environmental issues and problems. Information was asked on Likert 5 point scale i.e. Strongly Agree -1, Agree - 2, Disagree - 3, Strongly Disagree - 4
and Do Not Know - 5. The objective behind this information is to assess the reliability or seriousness of students towards environment and its degradation.

**Block-F (Questions to Assess Teaching Skills):** It comprised 5 questions to assess pedagogical ability B.Ed. students possess regarding environmental issues and problems. Information was asked on Likert 5 point scale i.e. Strongly Agree -1, Agree - 2, Disagree - 3, Strongly Disagree - 4 and Do Not Know - 5. The objective behind this information is to measure pedagogical capability of prospective teachers towards environment and its degradation. Pedagogical capability is scientific and step-wise planning of the learning material. Only the effective learning by prospective teachers can result in effective teaching to bring desirable behavioural change in students.

Behaviour changes are more likely to happen when conviction drives the individual (Jensen 2002). Conviction happens through understanding. Understanding should be perceived as the enlightening moment, when knowledge and experience come together. The implementation of knowledge must be based on the belief of doing the right thing (Laszlo and Laszlo 2002). The framing and setting of questionnaire plays very important role in deciding the environmental awareness. How the environmental awareness is decided, signify the steps required to solve the problems related to environmental conservation. A strong environmental education system which has its footing on strong environmental pedagogy is what it is required at present at all levels of education. Teachers with the right attitude and a will to equip the future generations to enable them imbibe the virtues of sustainable development are to take lead.

### 15. Educational Implications And Suggestions

This questionnaire was aimed at uncovering the knowledge and conceptions of prospective teachers i.e. B.Ed. students about the environment and other issues relating to the environment. This tool will help to find out environmental literacy and environmental awareness index of Prospective Teachers. In the present study, the break even point was set at 3.78 (value range from 3.50 to 3.99 on a scale of 5, decoded as Good Environmental Literacy), a norm that people can apply when they use this questionnaire in the future. For the purpose of measuring the level of environmental literacy an interpretative scale can be used as mentioned above under Description.

### 16. Conclusion

This questionnaire argues in favor of information, knowledge and awareness for the pure and clean environment and has suggested that developing responsible environmental behaviour is the ultimate goal of environmental awareness. A person who is environmentally literate can help in this process such as one who is environmentally honest and whose fundamental knowledge about environment is clear, has scientific style of thinking, pedagogically strong and good at implementing knowledge. It is very hard to determine the characteristics of the ecologically conscious person and the ecological responding behavior. It is even harder when it is expected to draw implications for the general people. This questionnaire can serve as tool to know a person’s environmental literacy.

### Bibliography