# Developing a Connect between Spiritual Ecology and Sustainability in theUniversity Curriculum through an Empirical Study

Pratibha Rai, Prem Kumari Srivastava and Saumya Shukla
rai.pratibha@gmail.com, premksri@gmail.com, sshukla_04@yahoo.com
Maharaja Agrasen College, Cluster Innovation Centre, Maharaja Agrasen College
University of Delhi

## ABSTRACT

With baseline identification works of scholars and practitioners such asBerry (2009),Vaughan Lee(2013),Rockefeller & Elder (1992), Kinsley (1995) and Wangari (2010)who argue that the global environmental dilemma is a consequence of a spiritual and moral predicament resulting from a lack of connectedness to, or alienation from, 'the other than human' natural world, the paper builds the connect between spiritual ecological consciousness and responsible ecological behaviour. The present comparative research presents findings on two educational knowledge systems of India: the University of Delhi (DU), and Dayalbagh Educational Institute (DEI) (Deemed University) Agra. The basis of this comparative study is the use of a General Ecological Behaviour (GEB) Scale (Kaiser et al 1999) slightly modified as a tool to assess the ecological conduct of groups forming: a student community exposed to modern education system with regular exposure to spiritual ecological practice vis a vis a community exposed to modern education system without spiritual ecological practice.. The researchers believe that the concept of spiritual ecology if ingrained deeply is likely to convert into ecological behaviour that fosters development on the planet Earth that is sustainable, respecting claims of the posterity. The interesting empirical findings of the study support the hypothesis and the results indicate comprehensive theorising. The Spiritual ecological consciousness level as a determinant of Ecological behavior Intent is stronger in the DEI data vis-a-vis DU data but the effect is small in both the data sets. The spiritual ecological awareness is there amongst the students but the conversion/transformation of this awareness to consciousness level is required at deeper level amongst both the student communities and this might happen with age and with continuous practice. The results are suggestive of creating a spiritual ecology centric education system that emboldens the progress towards sustainable development.

Keywords: ecological behavior intent (ebi), environmental responsibility(er), environmental knowledge(ek), general ecological behaviour(geb), spiritual ecological consciousness (sec),

# INTRODUCTION

The human spirit as an amalgam of energies, both mental and physical can recreate a sustainable world and reverse the path of development, which is destructive and vicious. (Lee, 2013) Ecological sustainability depends upon spiritual wakefulness and an attitude of conscientiousness. It has been recognised by spiritual ecologists that the creation is sacred and this sacredness should be venerated by our behavior. (Macy, 2012). In the wake of growing environmental problems like global warming, extinction of species and overconsumption, we human beings have to change our underlying attitudes and beliefs about the earth, and our spiritual responsibilities towards the planet. The present study was initiated with the belief that the more we expand the self to identify with "others"(people, animals, ecosystems) the more we realize ourselves. (Fox,1990)

Fox (1990) has used transpersonal psychology to validate this thought. An increasing dominant mechanical and global perspective and an insatiable need for material goods and technological development severed the collective sense of sacredness. There is no concurrence between anthropocentric environmentalism, which deals with environmental conservation specifically for exploitation for and by human beings and spiritual ecology. An integrated path is taken by spiritual ecology where it recognizes that all the different components of the ecosystem together with human beings function as a unit. (Lee. 2013) This underlying philosophy has ushered an entirely new set of environmental ethics, which promotes simple living, population control, and preservation of wilderness and the Green movement.

The key contribution in this study is two-fold. *First*, we make a theoretical contribution by presenting an integrative and comprehensive viewpoint about the relationship that exists between spiritual ecological consciousness and general ecological behavior. *Second,* we also make two methodological contributions. *One*, we modify environmental value scale (Kaiser et al.1999) to a spiritual ecological consciousness scale. This as per eastern philosophy is a more encompassing concept determining the ecological behavior via environmental responsibility… Positive ecological behaviour often gets reinforced with higher level of spiritual ecological consciousness identifying oneself with the whole and overall behavior of an individual in general. *Two*, none of the studies has attempted to quantify the relationship between spiritual ecological consciousness and general ecological behavior in the Indian context till now. A modest attempt has been made in this study to enumerate the various indicator variables that should be included in the spiritual ecological consciousness scale. The major difference in the approach of this study is the novelty in conceptualization. We empirically tested and validated our proposed framework using component-based Partial Least Square (CB-PLS) path-modeling technique using cross section data collected from the student community following slightly distinct education systems. We begin by developing hypotheses that offer a conceptual framework for examining the impact of value based education system in spirit and in practice on general ecological behavior. The methodology will be discussed in the subsequent section followed by data analysis. The interpretation of the findings is discussed in the next section. Discussion, conclusion and recommendations are finally presented towards the end.

# THEORY AND HYPOTHESES DEVELOPMENT

The deep-rooted spiritual intelligence shapes up the sustainability theory which enunciates that a distinct spiritual unity manifests in all life forms leading to spiritual growth. (Korten, 2013). Over centuries the Asian cultures have imbibed the values of community living and spirituality. Indigenous Asian societies have retained these values as individual interests being subservient to larger interests of the community and nature. This insight has resulted in innumerable socio-cultural practices like planting two trees when one is cut; giving nature time to heal and replenish the resource. Whenever dissipation of natural resource was an outcome of technological advancement for human comfort, Asians have given time to bring the resource to regenerative level. Asian cultural practices sustainability principles embedded in them.

In Asian communities, an individual's existence and functionality is dependent on symbiotic and harmonious living relationship with the whole environment. The recognition of strong linkages with ecosystems of the natural habitat amongst the communities awakened a sense of societal spiritual unison. (Kurten, 2013). These communities have a tendency to nurture the cultural values that recognize a linkage between the needs of the present generations and the posterity. Personal advancement on the spiritual course moulds the directional preferences in life. Seeking personal fulfilment via material possessions takes a back seat. The search for mental peace takes man closer to actions that lead to sustainable living. (Rajvanshi, 2010)

Reinforcing the significance of a symbiotic relationship between humans and their environment, both living and non- living, and the importance of fostering environmental sustainability through responsible ecological behaviour is well recognised fact. In pursuance of the above fact we endeavour to identify the spiritual values that are responsible for positive ecological behaviour. This requires understanding the concept of spiritual ecology and its impact on human behaviour. With this ideological faith, our team initiated the project of quantifying a connect between spiritual ecological awareness/consciousness level (combination of spiritual values and environmental values)  and ecological behavior of two  student communities, those of Dayalbagh Educational Institute and the University of Delhi exposed to different educational systems . The premise of the study is based on following hypotheses.

Hypotheses**:**
Hypothesis 1:

Environmental knowledge shapes Ecological Behaviour Intent.

Hypothesis 2:

Environmental responsibility reinforces Ecological Behaviour intent.

 Hypothesis 3.Spiritual ecological consciousness strengthens

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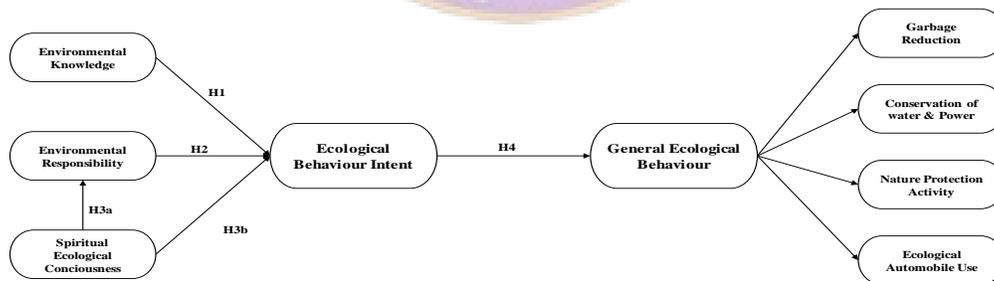
a) the environmental responsibility.

(b) and hence works through ecological behaviour intent and reflects in conduct of ecological behaviour.

Hypothesis4: Ecological Behaviour Intent jointly determined by environmental knowledge, environmental responsibility and spiritual ecological consciousness determines the General ecological behaviour that is reflected through four sub constructs: Garbage Reduction, Conservation of power and water, Ecological vehicle use and Nature protection activities. In accordance with this hypothesis, the scales were adapted to measure all constructs.

## CONCEPTUAL FRAMEWORK

Structural Model:

We adapted and modified the first order constructs as reflective measurement models from Kaiser et al studies (1999, 2000) in the Indian context. We also intuitively felt that believing in oneness of the universe strengthens the compassion for nature hence we took spiritual ecological consciousness instead of environmental value as one of the endogenous reflective construct, the other construct is environmental knowledge that determines the ecological behaviour of an individual via the intermediating reflective construct the ecological behavior intent. The measurement model constituted four first order explanatory reflective (predictor) constructs: i) environmental knowledge; ii) environmental responsibility; iii) spiritual ecological consciousness; iv) ecological behavior intent and general ecological behaviour as a reflective explained construct comprising of four second order sub constructs :a) garbage reduction; b) conservation of power and water ; c) nature protection activities; d) ecological vehicle use. In this case, the first-order constructs are dependent variables and the second- order factors becomes the independent variable (Byrne,2001).



Ecological behaviour is a function of environmental knowledge, spiritual ecological consciousness, ecological behaviour intent and environmental responsibility. (adapted from Kaiser et.al study 1999)

**Measures**

Using this research design, we assessed the validity of the content from the preliminary group of items generated from earlier studies of experts in this domain. In line with the concept and definition of spiritual ecology that emphasizes ecosystems as a constituent of different components functioning as a complete unit, initially 20 items were selected as determinants of spiritual ecological consciousness were selected. (The opinion of experts were sought to determine the sufficiency of every item by ranking the degree and whether it was able to measure the construct effectively on a 5-point Likert type scale(Rai, 2013). A ranking of 1 suggested a very low adequacy, and a ranking of 5 suggested an extremely high level of adequacy. The mean adequacy score for every item was calculated as the average marks given by the respondents. The standard deviation of adequacy score was then computed.(Rai, 2013)If the mean adequacy score was found to be more than 3 and the standard deviation was less than 1, the item was retained. 12 items were deleted, 3 items were modified and 2 items were added after reviews conducted by the experts in pretest.

Scale purification was done along with examination of scale's dimensionality and reliability. 10 items were retained in the spiritual ecology scale. There were 5 items representing environmental value and 5 items for spiritual consciousness that were picked up from extant literature review (Underwood &Teresi 2002 ; Lee, 2010), 5-point Likert-type scales were used to capture spiritual ecological consciousness varying from *strongly agree* to *strongly disagree*, regarding different facets of spiritual ecology.

It was appropriate to use the 5-point scale anchor since it would have been difficult for respondents to differentiate the response points given in the scale which would, otherwise, dilute the response validity (Clark & Watson, 1995). Reduction in the response options could have resulted in making the informants choose a neutral response by opting for the scale midpoint (Prendergast & Huang, 2003).

We used multi-item scales for dependent and explanatory variables, with each item measured using a 5-point Likert type scale, where a score of 1 indicated very strongly disagree, while a score of 5 indicated very strongly agree. We followed Kaiser et al (1999,2000,2003) to generate the initial items for the study constructs with slight adaptation. We studied the usable cases, (i) one for assessing dimensionality, validity and reliability and of the measures for all the individual constructs; and (ii) for testing the hypothesized conceptual model.

Dependent variable
General Ecological Behavior comprising of four sub constructs a) effort towards garbage reduction and removal; b) attempt to conserve power and water; c) Volunteering in nature-protection activities; (Kaiser. 1998) d) Ecological vehicle use

Explanatory variables
1. Spiritual Ecological Consciousness 2. Environmental Knowledge 3. Environmental Behaviour Intent

4. Environmental responsibility

Data Collection Strategy

We developed the survey and collected the data for this study in three stages: (i) qualitative field interviews (ii) pre-test and (iii) survey administration.

Qualitative field interviews
We conducted 10 explorative interviews with four academic researchers involved in the study of ecology and 3 spiritual practitioners. Each interview lasted between 60 and 90 minutes. We also conducted a detailed literature review to identify the necessary scale items to measure (Schilke & Goerzen, 2010)various constructs of this study.

Pre-test
We contacted 20 students for the pre-test of the survey out of which 12 agreed to participate in the pre-test of the survey. After completing the pre-test, we conducted interviews with them. Based on their feedback, we finalized the format of the survey and the guidelines for the respondents.

Sample and data collection
The study population comprised of student community of metro cities mainly from Delhi University and from Dayalbagh Educational Institute (Deemed University) Agra. We collected the data from May 2013 to October 2013 by  using the websites of survey monkey.com and googledrive.com. We used questionnaire method as a survey instrument. The instrument briefly introduced the informants to the objectives of the study and had a no objection clause pertaining to use of information provided by the respondent for research purpose was added in the questionnaire. We disseminated the survey to 2500 students. We received 558 responses out of which 451 surveys were usable, reflecting a response rate of 22.32 percent. Table 1 reflects characteristics of the sample.

Table 1

Characteristics of the Sample

| Respondent characteristics | Delhi University | Dayalbagh Educational Institute |
|---|---|---|
| | N = 256 | N = 195 |
| **Gender of Respondents** | | |
| Male | 48% | 62% |
| Female | | |
| | | |
| **Age of the respondents (yrs.)** | | |
| 18-21 | 42% | 78% |
| 22-25 | 58% | 22% |
| | | |
| **Type of Upbringing** | | |
| Urban | 60% | 42% |
| Semi-urban | 22% | 35% |
| Rural | 18% | 27% |

| | | | |
|---|---|---|---|
| **Exposure to Value Based Education** | 80% | 54% | |

ANALYSIS AND RESULTS

Data purification

We adopted the univariate approach (Hair *et al.*,1998) to identify outliers. As the size of the sample was more than 80, we used the criteria of $-4 \leq Z \leq 4$ to determine the outliers (Hair *et al.,* 1998). As per the results, there were no significant outliers. Following Newman (2003), we did not include completed questionnaires which had more than 10% missing values, and imputed the less than 10% missing values using Maximum Likelihood (ML) estimation. Following Armstrong and Overton's (1977) approach, we examined the non-response bias among the informants by comparing early respondents with late respondents.(Rai, 2013). Reminder e-mails were sent to non-respondents after waiting for three weeks for their response as this period of three weeks was used as a cut-off time period for response between late and early respondents. We assumed that there is no difference between late and early respondents, and the t-tests results indicated absence of considerable differences in the average of all items between the early and late respondents (p > 0.05).(Lew& Sinkovics, 2013).

We also assessed the data to examine linearity, multivariate normality, heteroscedasticity, multicollinearity, and autocorrelation. The data was not normally distributed as reflected by Shapiro Wilk test (p<.05)(Shapiro & Wilk,1965).We analyzed the validity and internal consistency of the indicator variables by carrying out exploratory factor. Item pool selected based on factor loadings is given in Table2.

Table 2

**Table 2**

**Item Pool used in different constructs after Pretest along with the source**

| | Latent construct 1: Spiritual ecological consciousness | Factor loading | Cronbach alpha | |
|---|---|---|---|---|
| SEC1 | There is some Higher Power/Universal intelligence. | .729 | | **Underwood L.G. &Teresi J, 2002** |
| SEC2 | I experience a spiritual dimension that gives me strength and love, and gives meaning to life. | .784 | | |
| SEC3 | Spiritual thoughts, meditation and prayer connects me with nature. | .749 | .857 | |
| SEC4 | I am a part of the Earth, not separate from it. My faith strengthens the belief of interconnectedness that exists amongst all components of the universe. | .689 | | **Llewellyn Vaughan Lee, 2010** |
| SEC5 | All living and non living things have the right to exist. All organisms' lives are precious and worth preserving. | .653 | | **Underwood L.G. & J. Teresi 2002** |
| SEC6 | Nature must be preserved as supernatural force and God are an integral part of it. | .671 | | |

| | | | | |
|---|---|---|---|---|
| SEC7 | I am liable for all my actions that include affecting the environment to a Supreme force. | .761 | | **Llewellyn Vaughan Lee, 2010** |
| | Latent construct 2: Environmental knowledge | | | |
| EK1 | All living beings have a symbiotic relationship. | .741 | | |
| EK2 | Human actions brings poisonous metals in our food chain through pollution of ground water, use of pesticides etc., | .768 | .780 | **Florian G Kaiser, et.al 1999** |
| EK3 | Presence of Ozone close to ground level may cause respiration problems. | .701 | | |
| EK4 | The excessive and continuous release of $CO_2$ will greatly change the climate of the world. | .686 | | |
| EK5 | There will be interruption in the food chain due to extinction of many species and this will affect many species in the subsequent food chain cycle | .703 | | |
| | Latent construct 3: Environmental Responsibility | | | |
| ER1 | My personal contribution is very small, I don't feel responsible for air pollution | .605 | | **Florian G Kaiser et.al 1999** |
| ER2 | I drive an automobile, I contribute to and I'm responsible for air pollution. | .612 | .603 | |
| ER3 | I feel party to the creation of the present environmental problems. | .566 | | |
| ER4 | I feel individual contribution towards environmental conservation will go a long way in reducing the damages being done to the environment. | .490 | | **Added in Indian context** |
| | Intermediating Latent construct 4: Environmental Behaviour Intent | | | |
| EBI1 | I will endeavour and support to make the inner cities free from automobile. | .598 | | |
| EBI2 | I would prefer not to drive to work any longer. | .820 | .751 | **Florian G Kaiser, et.al 1999** |
| EBI3 | My preference would be to go shopping without using my personal vehicle. | .831 | | |
| EBI4 | My preference would be to use my personal vehicle only when there is no other transportation mode available. | .761 | | |
| | Endogenous Latent Construct 5: General Ecological Behaviour- 4 sub constructs | | | |
| | Sub construct : Garbage Reduction | | | |
| GR1 | **I** ensure, used paper & news-paper isn't wasted & is sold for recycling or reuse. | .677 | .731 | **F.G. Kaiser & A Biel, 2000** |
| GR2 | **I** prefer paper and cloth bags to plastic bags for shopping. | .869 | | |
| GR3 | **I** try to minimise use of plastics and plastic bags. | .879 | | **adapted in Indian context** |
| | Sub construct: Conservation of Power & Water | | .684 | |
| CPW1 | I prefer to fill the bucket and then take bath instead of using the shower. | .699 | | **F.G. Kaiser & A Biel, 2000** |
| CPW2 | If clothes are hand washed, tap water is not kept running till the entire process is completed. | .791 | | **adapted in Indian context** |
| CPW3 | I ensure, while cleaning utensils tap water is not wasted by domestic help or by me. | .842 | | |

| | | | | |
|---|---|---|---|---|
| | Sub construct: Nature protection activity | | .694 | F.G. Kaiser & A Biel, 2000 |
| NPA1 | **I actively** participate in conservation drives of environmental groups | .853 | | |
| NPA2 | In past, **I'**ve politely pointed out to people their un-ecological behaviour. | .766 | | |
| NPA3 | **I** contribute financially to environmental organisations. | .742 | | |
| | Sub construct: Ecological automobile use | | .761 | adapted in Indian context |
| EVU1 | **I** usually drive, in terms of speed, to minimise my fuel consumption. | .728 | | |
| EVU2 | I prefer to switch off the engine of the vehicle at traffic red lights, traffic jams or while waiting for someone. | .800 | | |
| EVU3 | I walk or take public transport whenever possible. | .786 | | F.G. Kaiser & A Biel, 2000 |
| EVU4 | I recommend owning a fuel efficient car. | .737 | | adapted in Indian context |

SEC =spiritual ecological consciousness, EK=environmental knowledge, ER=environmental responsibility, EBI=Environmental behavior intent, GR= Garbage reduction, CPW=Conservation of power and water , NPA= Nature protection activity, EVU=Ecological automobile use

Common Method Bias

As we had collected all the measurement items through the uniform survey instrument, this has increased the possibility of common method bias (CMB) (Podsakoff *et al.*, 2003). Post-hoc analysis was conducted by using two statistical methods. *First*, we conducted one-factor test of Harmon (Podsakoff and Organ, 1986). The un-rotated factor solution results indicated that the extracted factor could explain only 31.87% (<50%) of the variance. As there was no single dominant factor, we assumed that CMB did not affect the significance of the relationships. (Rai, 2013). *Second*, we conducted the common latent factor method (Williams and Anderson, 1994), a more robust test, by adding a latent factor to the confirmatory factor analysis (CFA) model, connecting it to all observed items in the model, and then constraining the regression coefficients of the paths from this common latent factor to all the observed variables as equal. The unstandardized regression weights from the common latent factor was found to be approximately 0.14 and when squared, these unstandardized regression weights from the common factor was found to be about 1.96%, which is the common shared variance, suggesting that there was no problem of CMB in the data. (Rai, 2013)

Scale Validity and Reliability

In this study, we hence considered each and every first-order constructs as reflective measurement models. We analyzed the validity and internal consistency of the first-order constructs in two stages. *First*, we assessed the unidimensionality of these constructs by carrying out exploratory factor analysis (EFA). There is no universally accepted cut-off value for loadings, but we considered a loading of more than 0.4 (all values $\geq$ 0.56) for every construct as a good measure of their latent i.e. hidden construct. The results of the EFA confirmed the unidimensionality. *Next*, we examined the internal consistency by calculating the Cronbach's alpha for each first-order construct.

Table 3 shows that Cronbach's alpha for the items within each construct is more than the threshold assessment value of 0.6 (all are $\geq$ 0.69) (Nunnally, 1978), providing evidence of internal reliability.(Table2)

Convergent Validity and Discriminant Validity

The convergent validity of constructs of the first order were assessed by adopting three criterion.(Johnnes et al. 2012)*First*, the confirmatory factor analysis (CFA) results demonstrate that for each first- order constructs model of measurement, the fit indices were within the acceptable limits and the items factor loadings were found to be above the threshold limit of 0.4 (all were ≥ 0.52) (Table 2) (DeVellis, 2003).

*Second*, the composite reliability of all the first order constructs is above 0.60 level (all were ≥ 0.77) (Bagozzi*et al.,* 1991). *Third*, we carefully analysed the average variance extracted (AVE). The shared variances as depicted in Table 3 gives clear indication that these are higher than the suggested level of threshold (all were ≥ 0.52),thus supporting the convergent validity of the first-order scales.(Hair et al.,2012;Fornell and Larcker,1981)

We assessed the discriminant validity using Fornell and Larcker's (1981) criterion, which requires that thesquare of largest correlation between two constructs should be smaller than the AVE of the construct. All along the length of the diagonal, AVE for every construct is shown in Table 4.

 Also the square of correlation coefficients that exists between all linked constructs in theory appear as elements in the off-diagonal. (Cameron, 2004) When off- diagonal elements as appearing in matching columns and rows are found to be less than the diagonal element, the construct's discriminant validity is stated to be adequate.

Table 3 shows that this criterion is satisfied. The evidence of all constructs discriminant validity has been provided by the stated tests. The existence of discriminant validity amongst the constructs is indicated by the results of cross loadings since an indicator's loadings on its own construct are in all cases higher than all of its cross loadings with other constructs

**Table3**

*DEI Sample Convergent Validity*

|  | $R^2$ | C.A | AVE | CR | R |
|---|---|---|---|---|---|
| cpw | 0.4092 | 0.6012 | 0.5613 | 0.7907 | 0.228 |
| evu | 0.5785 | 0.7609 | 0.5823 | 0.8476 | 0.3397 |
| ebi | 0.212 | 0.7289 | 0.5507 | 0.8301 | 0.0371 |
| ek | 0 | 0.8478 | 0.684 | 0.8814 | 0 |
| er | 0.1941 | 0.6979 | 0.6727 | 0.7196 | 0.0433 |
| geb | 0.1832 | 0.0433 | 0.6900 | 0.8164 | 0.0582 |
| gr | 0.6445 | 0.7361 | 0.6598 | 0.8519 | 0.424 |
| npa | 0.5392 | 0.6934 | 0.6172 | 0.8273 | 0.3246 |
| sec | 0 | 0.8563 | 0.5367 | 0.8899 | 0 |

*DU Sample Convergent Validity*

|  | $R^2$ | CA | AVE | CR | R |
|---|---|---|---|---|---|
| cpw | 0.4725 | 0.5714 | 0.5675 | 0.7435 | 0.1673 |
| evu | 0.3996 | 0.5245 | 0.6064 | 0.7265 | 0.1581 |
| ebi | 0.1419 | 0.6269 | 0.5723 | 0.7808 | 0.0576 |
| ek | 0 | 0.7775 | 0.6961 | 0.8332 | 0 |
| er | 0.2532 | 0.4234 | 0.7191 | 0.7298 | 0.0549 |
| geb | 0.1483 | 0.7162 | 0.5178 | 0.7907 | 0.0317 |
| gr | 0.4437 | 0.5563 | 0.6303 | 0.7488 | 0.1874 |
| npa | 0.6191 | 0.5577 | 0.5306 | 0.7710 | 0.3273 |
| sec | 0 | 0.6476 | 0.6010 | 0.7627 | 0 |

$R^2$ = R Square, C.A.= Cronbach Alpha, AVE = Average Variance Extracted, CR= Composite Reliability, R= Redundancy
*cpw=conservation of power and water , evu=ecological vehicle use, ebi =environmental behavior intent,
ek =environmental knowledge, er =environmental responsibility, geb=general ecological behavior,
gr= garbage reduction, , npa= nature protection  activity, sec =spiritual ecological consciousness.

**Table 4**

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Discriminant Validity of DU sample using Fornell- Larcker Condition

|  | cpw | evu | ebi | ek | er | geb | gr | npa | sec |
|---|---|---|---|---|---|---|---|---|---|
| cpw | **0.5613** | | | | | | | | |
| evu | 0.0836 | **0.5823** | | | | | | | |
| ebi | 0.151 | 0.0522 | **0.5507** | | | | | | |
| ek | 0.0635 | 0.0471 | 0.1083 | **0.684** | | | | | |
| er | 0.0674 | 0.0335 | 0.1197 | 0.2783 | **0.6727** | | | | |
| geb | 0.4092 | 0.2121 | 0.1822 | 0.1128 | 0.1269 | **.69 00** | | | |
| gr | 0.1814 | 0.1984 | 0.0798 | 0.0705 | 0.1042 | 0.3633 | **0.6598** | | |
| npa | 0.1022 | 0.1604 | 0.1577 | 0.0721 | 0.0528 | 0.5391 | 0.2106 | **0.6172** | |
| sec | 0.1038 | 0.173 | 0.114 | 0.1338 | 0.094 | 0.1163 | 0.0726 | 0.1005 | **0.5367** |

Discriminant validity of DEI sample using Fornell- Larcker condition

|  | cpw | evu | ebi | ek | er | geb | gr | npa | sec |
|---|---|---|---|---|---|---|---|---|---|
| cpw | **0.5675** | | | | | | | | |
| evu | 0.1925 | **0.6064** | | | | | | | |
| ebi | 0.0383 | 0.079 | **0.5723** | | | | | | |
| ek | 0.0222 | 0.0335 | 0.1363 | **0.6961** | | | | | |
| er | 0.0123 | 0.0368 | 0.0275 | 0.0969 | **0.7191** | | | | |
| geb | 0.4725 | 0.3995 | 0.1483 | 0.0196 | 0.1423 | **0.5178** | | | |
| gr | 0.019 | 0.0588 | 0.0745 | 0.0025 | 0.0692 | 0.4436 | **0.6303** | | |
| npa | 0.1158 | 0.1058 | 0.0985 | 0.0021 | 0.0886 | 0.6192 | 0.207 | **0.5306** | |
| sec | 0.0076 | 0.0452 | 0.0118 | 0.1574 | 0.1832 | 0.0179 | 0.0772 | 0.0089 | **0.601** |

*cpw=conservation of power and water, evu=ecological vehicle use, ebi =environmental behavior intent,

ek =environmental knowledge, er =environmental responsibility, geb=general ecological behavior,

gr= garbage reduction, npa= nature protection activity, sec =spiritual ecological consciousness.

These results emphasize the reliability, convergent and discriminant validity of the measurement models (Schilke & Goerzen 2010) of all the first-order constructs.

Validity of Second-order Constructs

Since we had conceptualized *general ecological behavior* as a reflective-reflective type four-dimensional second-order construct, hence we also examined the validity and strength of these constructs. Factor loadings of the first-order latent constructs on the second-order construct were greater than 0.4 (all values are ≥ 0.56) (Table 2), thus indicating that each first-order construct was a good measure of its latent construct. We also assessed the convergent and discriminant validity of these second-order constructs. Table 2 shows that the CR of all the second-order constructs is above 0.7 levels. The AVE for each second-order construct is above

0.5.The AVE coupled with the strengths and significances of the parameter estimates of each of the reflective scales provides evidence of convergent and discriminant validity of the second-order constructs. The magnitude of the parameter estimates and the significance along with high AVE of each of the reflective scales gives verification that the second order constructs have convergent and discriminant validity.

Owing to different logic of measurement, one cannot apply the set criterion for evaluating reflective constructs, given as internal consistency and convergent validity, to assess formative measurement models (Diamantopoulos & Siguaw, 2006).Hence, we tracked the recommendations of Henseler et al.(2009) and Hair et al.(2012) and employed multicollinearity criterion and outer weights to examine the measurement features of the formative second order construct (Diamantopoulos & Winklhofer,2001; Bollen& Lennox, 1991). The variance inflation factors (VIF) were found to be much below the permissible level of 5 as the basis for test of multicollinearity (Hair et al., 2012). In addition, all item's weights were found to be significant(p<.001) (Cenfetelli &Bassellier, 2009). The correlation (Table 5) between the constructs indicate that the constructs are independent of each other and suitable to examine further to assess relationships amidst them.

Table 5

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**Correlation matrix of latent variables :DU sample**

|     | cpw | evu | ebi | ek | er | geb | gr | npa | sec |
|-----|------|------|------|------|------|------|------|------|------|
| cpw |      |      |      |      |      |      |      |      |      |
| evu | 0.2892 |      |      |      |      |      |      |      |      |
| ebi | 0.3886 | 0.2285 |      |      |      |      |      |      |      |
| ek  | 0.252 | 0.2172 | 0.3291 |      |      |      |      |      |      |
| er  | 0.2598 | 0.1831 | 0.346 | 0.5276 |      |      |      |      |      |
| geb | 0.6397 | 0.4606 | 0.4269 | 0.336 | 0.3563 |      |      |      |      |
| gr  | 0.426 | 0.4455 | 0.2825 | 0.2657 | 0.3229 | 0.6028 |      |      |      |
| npa | 0.3197 | 0.4006 | 0.3972 | 0.2687 | 0.2998 | 0.7343 | 0.459 |      |      |
| sec | 0.3222 | 0.1317 | 0.3778 | 0.3659 | 0.3067 | 0.3411 | 0.2695 | 0.3216 |      |

**correlation matrix of latent variables :DEI sample**

|     | cpw | evu | ebi | ek | er | geb | gr | npa | sec |
|-----|------|------|------|------|------|------|------|------|------|
| cpw |      |      |      |      |      |      |      |      |      |
| evu | 0.4388 |      |      |      |      |      |      |      |      |
| ebi | 0.1959 | 0.2812 |      |      |      |      |      |      |      |
| ek  | 0.1493 | 0.1833 | 0.3692 |      |      |      |      |      |      |
| er  | 0.111 | 0.1919 | 0.166 | 0.3114 |      |      |      |      |      |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| geb | 0.6874 | 0.6321 | 0.3851 | 0.14 | 0.3773 | | | |
| gr | 0.1379 | 0.2426 | 0.273 | 0.0504 | 0.2631 | 0.6661 | | |
| npa | 0.3404 | 0.3254 | 0.3139 | 0.0464 | 0.2977 | 0.7869 | 0.455 | |
| sec | 0.0876 | 0.2128 | 0.1088 | 0.3698 | 0.4281 | 0.1339 | 0.278 | 0.0945 |

_____

*cpw=conservation of power and water , evu=ecological vehicle use, ebi =environmental behavior intent,
 ek =environmental knowledge, er =environmental responsibility, geb=general ecological behavior,
 gr= garbage reduction, , npa= nature protection  activity, sec =spiritual ecological consciousness.

The Model's  Predictive Strength

We analyzed the model's predictive strength by using $R^2$ statistics of the general Ecological behavior, which is the only endogenous construct in the model.(Lew& Sinkovics, 2013)The $R^2$ value is 0.183   for the DU sample and .148 for the DEI sample which is more than the permissible threshold of 0.1 (Falk & Miller, 1981).$R^2$ statistic of intermediating construct of environmental responsibility and environmental behavior intent in the Delhi University sample (.19 and 21) and the Dayalbagh Educational institute sample (.14, and 25) is also found to be higher than the threshold limit. Therefore, there is substantiation of the appropriateness of conceptual model for measuring the General Ecological Behaviour, that is, the conceptual model explains significant proportion of  the squared standard deviation in endogenous construct.

We evaluated the predictive weight of the conceptual model by means of Stone-Geisser's $Q^2$ statistic (Stone, 1974; Geisser, 1975; Lew& Sinkovics 2013). We used blindfolding re-sampling approach to compute the $Q^2$ statistic. The $Q^2$ values for the endogenous construct GEB  was greater than zero (0.22, .19) for both DEI and  DU sample substantiating  the predictive significance of the model (Chin, 1998).

Test of hypotheses

Testing of hypotheses was done by assessing the sign and measure of structural path coefficients and the corresponding t-values, measured by applying nonparametric bootstrapping technique (Chin, 1998).

Effect size

To assess the strength of the main effects and interaction effects, the effect size $f^2$ were calculated    using the formula: $f^2 = (R^2_{included} - R^2_{excluded})/(1 - R^2_{included})$ (Cohen,1988.; Kyu& Sinkovics, 2013).The $f^2$ analysis complements $R^2$ in the sense of examination of the effect sizes of the impact of particular latent variables on the dependent latent variables. (Chin, 2010). We used the $f^2$ values of 0.02, 0.15 and0.35, respectively as guidelines for small, medium and large effect sizes of the predictive variables (Cohen, 1988). Table 6presents  a summary of respective effect sizes of the main effect and the  interaction effect variables at the structural level.

**Table 6**

Effect size of the exogenous constructs:

|  |  | DU Sample | DEI Sample |
|---|---|---|---|
| GEB | $R^2$----------- | 0.183 | 0.148 |
| EBI | $R^2$----------- | 0.21 | 0.25 |
| ER | $R^2$----------- | 0.19 | 0.14 |

| $f^2$ | | Path coefficient | $f^2$ | Path coefficient |
|---|---|---|---|---|
| ek-------- | 0.1609 | ek ->ebi  0.2462 | 0.1404 | ek ->ebi 0.1053 |
| er-------- | 0.1268 | er ->ebi  0.1900 | 0.1471 | er ->ebi  0.2011 |
| ebi------- | 0.1601 | ebi ->geb 0.4269 | 0.1819 | ebi ->geb 0.3851 |
| sec------ | 0.8431 | sec ->ebi  0.1026 | 0.1096 | sec ->ebi 0.1909 |
|  |  | sec ->er 0.1706 |  | sec ->er  0.2281 |

\* GEB =General Ecological Behaviour, ek =environmental knowledge, er =environmental responsibility,
 ebi =environmental behavior intent,  sec =spiritual ecological consciousness.

Post-hoc Analysis

*Model estimation with data subset*: As recommended by (Hair et al., 2012), we estimated our conceptual framework on data subsets in order to test the stability of the estimates across different smaller data sets and also on the compiled data. The PLS analysis results on the data subsets are exhibited in the  Table 6.The model estimates from the data subset are substantively similar to those from the full data, although there are a few differences in size and / or level of significance of  values of some structural path coefficients. In summary, given the plausibly high overall consistency between the model estimates obtained from the full data and the two data subsets, it can be deduced that the PLS analysis results with full data are robust, and not biased due to the nature of the sample included in the estimation procedure.

*Analyzing heterogeneity through multi-group analysis*. There can be a heterogeneity concern in models that are analyzed by using PLS in the sense that different population parameters may be distinctively at variance for subpopulations(Lew & Sinkovics, 2013). Therefore, with the objective of examining the probable heterogeneity of the observations subject to various eventualities, we carried out multi-group analysis in order to compare the two subpopulations of Dayalbagh Educational Institute  and Delhi University data using parametric approach. (Table 7).  As a result the standard errors of the structural paths between the groupings  were obtained by using bootstrapping procedure. Then the differences between the path coefficients were tested using t-statistics. Subsequently, the path coefficients divergences were tested by utilizing t- statistics.(Lew & Sinkovics, 2013).While there were differences between the path coefficients of various constructs, however the t-test results   clearly verified that except for a few paths, these differences amidst the groups being studied are not significant, the reason being that the students  of DEI(54%) and DU (80%) have been exposed to value based education system at school level.

**Table 7**

**Multi-group Chin test**

| | Delhi University Data | | | Dayalbagh Educational Institute Data | | | |
|---|---|---|---|---|---|---|---|
| | Path coefficient | standard Error | t value | Path Coefficient | standard Error | t value | Test for equality of SE |
| ebi ->geb | 0.4269 | .1140 | 3.7429 | .3851 | .1092 | 3.5261 | .0746 |
| ek ->ebi | 0.2462 | .1034 | 2.4010 | .3674 | .1053 | 1.7982 | .0409 |
| er ->ebi | .1900 | .0956 | 1.9874 | .2011 | .0981 | 2.0499 | .0517 |
| geb ->cpw | .6397 | .0946 | 6.7644 | .6874 | .1050 | 6.5489 | .3179 |
| geb ->eau | .7606 | .0691 | 11.007 | .6321 | .0807 | 7.8317 | .6103 |
| geb -> gr | .8028 | .0697 | 11.517 | .6949 | .0869 | 7.9960 | .8940 |
| geb ->npa | .5343 | .2987 | 1.8180 | .7869 | .3762 | 2.0910 | .9099 |
| sec ->ebi | .1026 | .0578 | 1.7750 | .1909 | .0686 | 2.7823 | .6984 |
| sec ->er | .1706 | | | .2281 | | | |

*ebi =environmental behavior intent,  geb=general ecological behavior, ek =environmental knowledge, , evu=ecological
  vehicle use, cpw=conservation of power and water  gr= garbage reduction, npa= nature protection  activity,
  sec =spiritual ecological consciousness,  er =environmental responsibility

## DISCUSSION

The space between environmental stance  and the conduct of behaviour  that is pro-ecological
is unbridged and poses a severe challenge. The literature on environmental psychology does
engagingly encompass the  subjects of attitude and behaviour (Smythe & Brook,1980), notions
deduced from sphere of morality and ethics (Heberlein,1972; Thogersen,1996) or behaviour
based on altruism  (Hopper & Nielson,1991;Stern et al.,1993; Hallin,1995), on pro-social
norms  (Granzin & Olsen,1991; Van Liere&Dunlap,1978) yet these multiple  perspectives often
fall short to  incorporate  contemplations that improves the conditions  of others at one's own
expense i.e. of humanity and other forms of life on earth.
 Spirituality fosters an empathetic view of nature and with every bit of spiritual growth we
become more harmonious with it and the resolve to conserve it strengthens. In addition, the
ability to adapt with each other for the attainment of universal good takes precedence over
individual well-being. Spiritual ecology has wide connotations that reverberate all through
Hindu scriptural writings. The ancient eastern philosophies have laid emphasis on living in
harmony with nature and on identifying oneself with the several components of the universe.
The extant literature review of the western philosophy also converges towards the same. The
reverence for nature is sermonized in all religions and the truism of simple and uncomplicated
living is entrenched.

Kaiser et al (1999) have projected the environmental-values, knowledge, and ecological
behaviour intent as the minimal common denominator of nearly all approaches to
environmental attitude. In the present study, *firstly,* we proposed that environmental mindset
requires to be broadened to include the higher dimension of spirituality in the education system

to promote a responsible ecological behavior. The connect between spiritual ecological consciousness leading to environmental responsibility as well as strengthening of behavioural intent as an intermediating factor converting in to responsible ecological behavioural conduct in both the data sets of Delhi University (DU)(sec ->er 0.1706, er ->ebi 0.1900, ebi ->geb 0.4269) and Dayalbagh Educational Institute (DEI) (sec->er 0.2281, er ->ebi 0.2011, ebi ->geb 0.3851) (Table 6)have been established satisfying the four hypotheses stated in the conceptual model as appearing in section II.

*Secondly*, the differences in the ecological conduct of subsamples taken from the two knowledge systems do not appear distinctly different owing to following reasons:

a) Exposure to value based education system since school days in the DU sample is higher (80%) as against DEI sample (54%). Spiritual education as an integral part of the curriculum through community service is imparted religiously in DEI Majority (70%) of our respondents in DEI were Ist and IInd year undergraduate students. If we were to expect its impact to be translated into responsible ecological conduct in a short span of one year to two years only we would be over ambitious.

b) This transformation in behavioural aspect can only be tracked through time series data and is an inference drawn from intuitive analysis. This hypothesis is based on intuitive understanding about behaviour of people who have reached higher levels of consciousness. The model used in the present study is a slightly modified model used in Kaiser's study (1999,2000)and the results so obtained are robust and $R^2$ are not very high. We feel that the model needs to also incorporate the difficulties faced in the conduct of ecological behaviour also and this appears to be a limitation of the study.

## CONCLUSION AND RECOMMENDATIONS

The strength of the path coefficients in the two data sets of Delhi University and Dayalbagh Educational Institute are slightly different. Spiritual ecological consciousness level as a determinant of Ecological Behavior Intent is stronger in the DEI data vis-a-vis DU data but the effect is small in both the data sets. From the study a scope for future research on the same subject can be seen since the difficulties encountered by the respondents in the conduct of ecological behavior also needs to be incorporated to have a greater variance explained by the model. Also it appears that the spiritual ecological awareness is present amongst the students but the conversion/transformation of this awareness to consciousness level is required at deeper level in both the student communities; and this might happen with age and with continuous practice. The seed of spiritual ecological bent must be sown at an early age but for this to show conclusive results in terms modified behaviour might take time and can be expected to depend on the strength of the awareness level to actually transcend the difficulty level in conducting ecological behavior. The ancient and modern insights can be melded to reach higher intensity of social, intellectual and spiritual progression which was far beyond the reach of preceding generations particularly owing to immense potential exposure and awareness that we are

endowed with. The restoration of spiritual, social and economic links of individuals to nature are the prerequisites for the preparedness to achieve these heights. With the powerful gift of consciousness, we can set out a unique journey guided by collective consciousness that shapes the course of social, material, and spiritual advancement reshaping our relationship with the living earth. These values need to be nurtured in the coming generations with caution and compassion since early age.

## ACKNOWLEDGMENTS

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