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CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

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INVENTIVE USE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN THE OPEN AND DISTANCE LEARNING SYSTEM: AN EMPIRICAL STUDY

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ABSTRACT

This study aimed to use inventive ICT tools in Open and Distance Learning system (ODL) to generate awareness among the people, on the issues of environment and their adverse impact, technological deficiencies, skills gap in implementing the various environmental assessment tools, and the preventive measures to stop the further deterioration of the environment by proposing a "technology-centric skill learning model". By using the developed model need assessment survey has been done on the required ICT related competencies a teacher should possess under Technological Operations & Concepts domain, Professional domain and Social & ethical domains, from the University teachers, researchers, NGOs working in the environmental sector. Data was collected and analyzed using various statistical techniques. Findings of the study reveal that all the teachers agreed to possess those competencies to develop and deliver the ICT based skill development programmes through ODL mode.

KEYWORDS

ODL, technology- centric, domain, ICT competencies, skill development.

INTRODUCTION

Internationally there is a revamp in educational systems by integrating Information and Communication Technologies (ICT) in the teaching and learning process, to equip the students with the knowledge and skills in their respective subject matter. This educational revolution makes the teaching profession from teacher-centered to student-centered learning environments. ICT facilitates self learning process by using computer based technologies, digital imaging, the internet, file servers, data storage devices, network infrastructure, desktops, laptops and broadcasting technologies. To use this technology in teaching learning process a teacher should possess basic knowledge on ICT to teach effectively and to promote active, collaborative, creative and integrative self learning methods. A model on a systemic architecture for capacity building and need based education using ICT has been developed (Rupini et al 2016).

The purpose of this study is to examine the role of information and communication technology (ICT) in enhancing community outreach, academic and research collaboration, education and support services (IT-CARES) in an academic setting.

OBJECTIVES

The aim of this paper is to study the intensive use of ICT in Open and Distance Learning system for skill development in educational sector. Accordingly, the following objective have been formulated:

1. To standardize the developed ICT model on the basis of parameters.
2. To check the influential factors and variables required in ICT model for skill development.

To achieve these objectives, the author implemented the developed model in the following way.

IMPLEMENTATION

To begin with as part of implementation, a template was designed using need assessment manager component of the system for a questionnaire. A survey was conducted online on "ICT competencies for developing and offering skill based education programmes through Open and Distance Learning mode." The following shows the outcome of the survey as part of need assessment to start any programme either it could be for awareness, skill development or a need-based education.

SURVEY

By using the proposed model, an attempt is made to conduct a survey through empirical research approach on required proficiency of distance education teachers to develop and deliver the content by using ICT. For this purpose, the following methodology was adopted.

METHODOLOGY

SELECTION OF SAMPLE RESPONDENTS

The study is based on the primary data collected by adopting the stratified sampling. The first stage for identifying the different categories of respondents namely, University teachers from ODL and conventional, researchers and NGO's working in environmental sector. At the second stage the sample respondents have been chosen through judgment sampling method. The sample size was decided as 300 respondents. Out of which 150 respondents are from university teachers, 100 respondents are from research institutes and 50 respondents from NGOs have been chosen. Finally, 245 filled in responses were received from the respondents.

DATA COLLECTION INSTRUMENT

The questionnaire was developed by identifying three broader domains namely 1. Technological operations and concepts domain 2. Professional domain 3. Social and ethical domain as per the National ICT competency standard for teachers (NISC) developed by the Commission on ICT. These three domains comprise total 30 questions formulated by using the 5 point Likert-scale. The questionnaire was standardized by conducting a peer review, which was examined by four experts and then finalized. Accordingly, the primary data was collected from the above stated sample respondents with the help of this structured questionnaire. Codes have been allotted to each question for analysis with the help of AMOS.20.

TECHNIQUES USED FOR ANALYSIS

Percentages, frequency and mean are used with the help of SPSS. To check the reliability and validity of the defined constructs, Structural Equation Modeling with the help of AMOS 20.

DATA ANALYSIS

TABLE 1

Factor	N	SD		D		UD		A		SA	
		f	%	f	%	f	%	f	%	f	%
TOCa	245	16	6	27	11	37	15	67	27	98	40
TOCb	245	22	9	59	24	53	21	74	30	37	15
TOCc	245	4	1	26	10	55	22	107	44	53	22
TOCd	245	6	2	20	8	51	21	106	43	62	25
TOCe	245	6	2	22	9	82	33	97	39	38	15
TOCf	245	4	1	31	12	32	13	112	46	66	26
TOCg	245	13	5	16	6	29	12	105	43	82	33
TOCh	245	6	2	18	7	49	20	114	46	58	24
TOCi	245	5	2	18	7	35	14	112	46	75	31
TOCj	245	8	3	22	9	43	18	113	46	59	24
TOCk	245	7	3	23	9	52	21	113	46	50	20
TOCl	245	5	2	18	7	66	26	114	46	42	17
TOCm	245	13	5	23	9	40	16	112	46	57	23
TOCn	245	6	6	28	11	43	17	108	44	50	20
TOCo	245	7	3	23	9	79	32	101	41	35	14
TOCp	245	8	3	46	18	41	16	112	45	38	15
TOCq	245	7	2	22	9	37	15	135	55	44	18
TOCr	245	7	2	14	5	32	13	109	44	83	33
TOCs	245	9	3	34	13	45	18	114	46	43	17
TOCt	245	8	3	23	9	51	20	117	48	46	18
Pda	245	9	3	20	8	49	20	125	51	42	17
PDb	245	5	2	25	10	57	23	105	42	53	21
PDc	245	7	2	35	14	62	25	91	37	49	20
PDd	245	4	1	29	11	91	37	92	37	29	11
Pde	245	23	9	52	21	53	21	72	29	45	18
SEDa	245	18	7	41	16	69	28	81	33	36	14
SEDb	245	8	3	35	14	61	24	81	33	60	24
SEDc	245	16	6	60	24	62	25	63	25	44	18
SEDd	245	7	2	30	12	40	16	109	44	59	24
SEDe	245	3	1	21	8	42	17	89	36	90	36
Valid N (listwise)	245										

Table -1 discloses that the opinions of the respondents on each question on an average is above 65% agreed to possess the required ICT skills in the proposed domains to develop and deliver the programmes through ODL mode. On observation of the frequencies and its percentages there is a significant variation found from the score of strongly disagreed & disagreed to strongly agreed & agreed. The Mode of all variables (questions) from the three constructs observed that either 'Agreed' or 'Strongly Agreed'. However, in order to check the reliability and validity of the defined constructs, the following Structural Equation Modeling (SEM) techniques have been used.

VALIDATION OF CONSTRUCTS (COMPONENT IDENTIFICATION)

TECHNOLOGY OPERATION AND CONCEPTS

TABLE 2

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.927**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**2333.050**
	df	**190**
	Sig.	**.000**

KMO (Kaiser-Mayer-Olkin): Kaiser-Mayer-Olkin (1974) recommends accepting values greater than 0.5 as acceptable (values below this should lead you to either collect more data or rethink which variables to include). Furthermore, values between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb (Hutcheson and Sofroniou, 1999). For these data the value is 0.93, which falls into the range of being superb. It is established that factor analysis is appropriate for these data. KMO measured of sampling adequacy mixed the minimum criteria, the value of KMO measure of sampling adequacy.

BARTLETT'S TEST OF SPHERICITY: Bartlett's Test is another indication of the strength of the relationship among variables. This is also the way to test the null hypothesis. For factor analysis to work we need some relationships between variables and if the R-matrix were an identity matrix then all correlation coefficients would be zero. Therefore, we want this test to be significant (i.e. have a significance value less than 0.05). A significant test tells us that the R-matrix is not an identity matrix; therefore, there are some relationships between the variables. For these data, Bartlett's test is highly significant ($p < 0.001$), and therefore factor analysis is appropriate.

TABLE 3: Rotated Component Matrix[a]

	Component	
	Technological Pro	Conceptual Domain
TOCp	.764	.168
TOCq	.755	.152
TOCt	.719	.216
TOCn	.651	.371
TOCr	.627	.291
TOCl	.593	.405
TOCo	.584	.298
TOCj	.561	.527
TOCs	.493	.230
TOCh	.471	.377
TOCe	.055	.760
TOCf	.151	.713
TOCg	.344	.712
TOCd	.396	.672
TOCm	.534	.585
TOCc	.411	.572
TOCk	.486	.518
TOCi	.455	.461
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.		
a. Rotation converged in 5 iterations.		

By factor analysis two components are identified in Technological Operation and Concepts that is Technological Pro and Conceptual Domain

PROFESSIONAL DOMAIN

TABLE 4: KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.709
Bartlett's Test of Sphericity	**Approx. Chi-Square**	205.560
	df	10
	Sig.	.000

For these data the value is 0.709, which falls into the range of being good sample adequacy.

TABLE 5: COMPONENT MATRIX[A]

	Component
	1
PDb	.830
Pda	.781
PDd	.663
Pde	.532
PDc	.440
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Factor analysis identified only one component in Professional Domain.

SOCIAL AND ETHICAL DOMAIN

TABLE 6: KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**.814**
Bartlett's Test of Sphericity	**Approx. Chi-Square**	**520.361**
	df	**10**
	Sig.	**.000**

For these data the value is 0.709, which falls into the range of being very good sample adequacy.

TABLE 7: COMPONENT MATRIX

	Component
	1
SEDb	.855
SEDc	.827
SEDa	.808
SEDd	.780
SEDe	.665
Extraction Method: Principal Component Analysis.	

Factor analysis identified only one component i.e., Social and Ethical Domain.

1. CONVERGENT VALIDITY: In this study, convergent validity was assessed by factor loading, Composite Reliability (CR) and Average Variance Extracted (AVE) (Fornell & Larcker, 1981). Confirmatory Factor Analysis (CFA) is conducted to estimate factor loading of variables. In fact, a factor loading presents the level of a regression path from a construct to its indicators. According to (Hair et al.,2010), an acceptable factor loading value is more than 0.5 and when it is equal to 0.6 and above it is considered good for one indicator. Convergent validity was verified for each factor loading. Some data transformations have been done and those observed variables were deleted whose factor loadings were less than 0.6 in the process of model fit analysis.

TABLE 8: STANDARDIZED REGRESSION WEIGHTS: (Group number 1 - Default model)

Variables		Constructs	Factor Loading (λ)
TechPro	<---	TC	0.921
Conceptual	<---	TC	0.999
TOCp	<---	TechPro	0.717
TOCq	<---	TechPro	0.677
TOCt	<---	TechPro	0.722
TOCn	<---	TechPro	0.697
TOCr	<---	TechPro	0.666
TOCl	<---	TechPro	0.718
TOCj	<---	TechPro	0.762
TOCf	<---	Conceptual	0.618
TOCg	<---	Conceptual	0.721
TOCd	<---	Conceptual	0.761
TOCm	<---	Conceptual	0.744
TOCc	<---	Conceptual	0.664
TOCk	<---	Conceptual	0.707
TOCi	<---	Conceptual	0.633
SEDa	<---	SED	0.718
SEDb	<---	SED	0.829
SEDc	<---	SED	0.83
SEDd	<---	SED	0.672
SEDe	<---	SED	0.632
Pda	<---	PD	0.742
PDb	<---	PD	0.794
PDd	<---	PD	0.518

The average variance extracted (AVE) for each of the factors is calculated manually for all the constructs are presented in Table-8.

TABLE 9: AVE AND FACTOR LOADINGS OF THE FACTORS

Constructs	AVE	Construct Factor Loading
Professional Domain	0.583	0.68
Social & Ethical	0.549	0.74
Technology Operation & Concepts	0.923	0.96

As seen from the table, all AVE values and factor loadings are greater than 0.5 with almost all values above 0.60. For all the constructs, all items have high loadings, with majority above 0.5 therefore demonstrating convergent validity. This study satisfied this criteria hence convergent validity was established.

COMPOSITE RELIABILITY

Composite reliability measures the overall reliability of a set of items loaded on a latent construct. Value ranges between zero and one. Values greater than 0.70 reflect good reliability, between 0.60 – 0.70 is also acceptable if other indicators of the construct's validity are good (Hair et al., 2006). Reliability of the factors was estimated by checking composite reliability. Composite reliability should be greater than the benchmark of 0.7 to be considered adequate (Fornell and Larcker, 1981).

The composite reliability and AVE'S of all constructs are presented in **Table 10.** All composite reliabilities of constructs have a value higher than 0.70, indicating adequate internal consistency.

TABLE 10

Construct	CR (Composite Reliability)	AVE
Professional Domain	0.731	0.583
Social & Ethical	0.857	0.549
Technology Operation & Concepts	0.960	0.923

DISCRIMINANT VALIDITY

Discriminant validity is established on the basis of AVE and Maximum Shared Variance (MSV). Criteria for ensuring discriminant validity are MSV < AVE and Average Shared Variance (ASV) < AVE (Hair et al., 2010). In this study, MSV and ASV for each of the five individual constructs have been determined and presented in **-3**. MSV and ASV of each factor shows the proper sharing of variances with the AVE. Maximum AVE is explained in Learning from experience which is having least error with highest composite reliability. Other factors contain the same property on the basis of the CR, AVE, MSV and ASV score.

TABLE 11

Constructs	CR	AVE	MSV	ASV
Professional Domain (PD)	0.731	0.583	0.580	0.640
Social & Ethical (SED)	0.857	0.549	0.551	0.546
Technology Operation & Concepts (TOC)	0.960	0.923	0.780	0.686

To examine discriminant validity, the partial proof of discriminant validity is presented in **table 12**. The diagonal items in the table represent the square root of AVE's, which is a measure of variance between construct and its indicators, and the off diagonal items represent squared correlation between constructs and fond that the most strongly inter correlated items are **Technology Operation & Concepts (TOC) activities best facilities of ICT.**

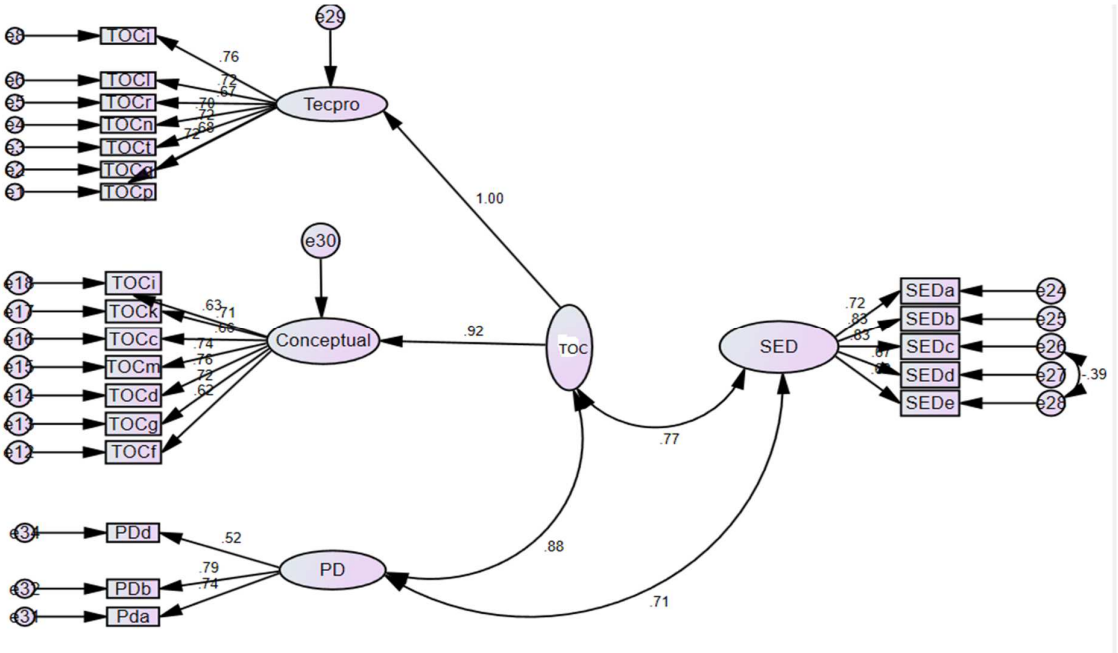
TABLE 12

Constructs	PD	SED	TOC
Professional Domain (PD)	0.695		
Social & Ethical (SED)	0.708	0.741	
Technology Operation & Concepts (TOC)	0.883	0.769	0.961

NOMOLOGICAL VALIDITY

In the given model of ICT it would be identified that how ICT scales are related with the factors and factors are interrelated with other constructs. On the basis of available data and its transformation, fit Measurement Model is representing 11 factors which are highly correlated and 25 variables supporting the factors. The **figure-1** of model supports the statement along with statistical scores explained earlier.

FIGURE 1: ICT MODEL



After measuring the reliability and validity of the constructs and the variables of the model, the results of Confirmatory Factor Analysis (CFA) using AMOS 20 has been used to evaluate the model fit of the measurement model. The proposed model in this study is an over-identified model with positive degrees of freedom (203) as shown in **table-13** drawn from the AMOS output. In this model there are 253 distinct sample moments (i.e., pieces of information) from which to compute the estimates of the default model, and 105 distinct parameters to be estimated, leaving 203 degrees of freedom, which is positive (greater than zero). Hence the model is an over identified one.

TABLE 13

Number of distinct sample moments	253
Number of distinct parameters to be estimated	50
Degrees of freedom (253 - 50)	203

Finally, model estimation and evaluation have been done by using standard methods and found that the estimation process yielded an admissible solution, evaluation process indicates good fit model.

VALIDATING THE MEASUREMENT MODEL

The results shown in **table** -14 provide a quick overview of the model fit, which includes the value (497.905), together with its degrees of freedom (203) and probability value (0.000). In the table NPAR stands for Number of parameters, and CMIN (χ^2) is the minimum discrepancy and represents the discrepancy between the unrestricted sample covariance matrix S and the restricted covariance matrix. DF stands for degrees of freedom and P is the probability value.

TABLE 14: MODEL FIT

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	50	497.905	203	.000	2.453

TABLE 14: FIT STATISTICS OF THE MODEL

Fit Statistic	Recommended	Obtained
χ2	……	467.905
df	……	203
χ2 Significance	p<= 0.05	00
χ2/df	<5.0	2.453
GFI	>.80	0.85
AGFI	>.80	0.81
NFI	>.90	0.919
RFI	>.90	0.9
CFI	>.90	0.90
TLI	>.85	0.89
RMSEA	<=.08	0.077

For the current CFA model, as shown in **table**χ^2/df was 2.453 (= 497.905; df = 203), suggesting acceptable model fit. Goodness of Fit index (GFI) obtained is 0.92 as against the recommended value of above 0.90, The Adjusted Goodness of Fit Index (AGFI) is 0.88 as against the recommended value of above 0.85 as well. The Normed fit Index (NFI), Relative Fit index (RFI), Comparative Fit index (CFI), Tucker Lewis Index (TLI) are 0.92, 0.90, 0.90, 0.89 respectively as against the recommended level of above 0.80 to 0.85.RMSEA is 0.077 and is equal to the recommended limit of 0.08. Hence the model shows an overall acceptable fit. The model is an over identified model.

The confirmatory factor analysis shows that how the model can be proved. The constructs and variables verified all the level of goodness of fit. Model explains that how ICT constructs are intercorrelated and need to be implements collectively. Implementation of **Technology Operation & Concepts (TOC)** is showing the strong relation this strengthen the ICT implementation.

FINDINGS

The survey revealed that, most of the participants perceived that teacher should possess ICT competencies to develop and offer ODL programmes by integrating ICT as a tool. It was established that by using various ICT tools, models for different concepts, teachers can explicitly explain and enhance their ability of instruction.

DISCUSSION AND CONCLUSION

ICT based education is not a new concept but the attempts to make it a part of the pedagogy is new and challenging. Its usage in pedagogical resources reduces the distance learner dependency on the SLM. It provides programme developers an opportunity to use the virtual tools associated with rich learning material, lecture series and practicals. Some of the ICT tools like Google earth, virtual field trip, virtual museum, virtual economic pond, video pod casts and environmental field trips provide additional knowledge and experience which are inaccessible to the learner. This creates an authentic setting to ODL philosophy and pedagogy. This paper also justifies the incorporation of ICT to develop and offer educational programmes in environmental sector through ODL mode, based on the psychological and intellectual abilities of present generation learner because they are proactive, independent and can obtain the required information from the society whenever required. The learner needs to process the information swiftly for decision making. The objectives of this paper can be achieved through proper utilization of the appropriate ICT tools by bringing awareness, by developing skill based programmes, creating positive attitude and learner's participation for critical thinking. The skill orientation makes the learner to recognize and solve the environmental problems at all levels that helps the society towards environmental stewardship as well as for future resolutions.

The survey results validated the competencies required by a programme developer in distance education through blended mode of ODL and online. Based on the developed model it is proved that required skills of ICT as projected in the model are to be possessed by a teacher. Therefore, it is suggested that any institution developing programmes through ODL with the intervention of educational ICT should design quality training programmes and evaluation for the teachers are indispensable in general and particularly development of need based programmes in the domain of environment.

REFERENCES

1. Albaum, G. (1997). The Likert scale revisited: An alternate version. Journal of the Market Research Society, 39, 331-349.
2. Bentler, P.M. and Bonnet, D.C. (1980), "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," Psychological Bulletin, 88 (3), 588-606.
3. Bollen, K. A., & Long, J. S. (1993). *Testing structural equation models*: Newbury Park, CA: Sage.
4. Browne, M. W., &Cudeck, R. (1993). Alternative ways of assessing model fit. In: K. A. Carmines, E.G. and Zeller, R.A. (1979), *Reliability and Validity Assessment*, Beverly Hills, CA: Sage.
5. Coombs, C. H. (1960). *A theory of data. Psychological Review*, 67, 143-159.Diamantopoulos, A., Siguaw, J. &Siguaw, J. A. (2000). *Introducing LISREL: A guide for the uninitiated,* Sage Publications. December 23, 2011.
6. Earthscan, London (2002);1-21.10.http://www.moef.gov.in/division/introduction-8.
7. Garson, G. D. (2011). Structural Equation Modeling. [Online] Available: *http://faculty.chass.ncsu.edu/garson/PA765/structur.htm (May 10, 2011).*
8. Glasson J. 'The First 10 Years of the UK EIA System: Strengths, Weaknesses, Opportunities and Threats', Planning Practice & Research (1999)14 (3): 363-375
9. Glasson, J. Therivel, R. and Chadwick, A. Introduction to Environmental Impact Assessment, Spon Press, London (1999).
10. Hair, J. F., Black, W. C., Balin, B. j., & Anderson, R. E. (2010). *Multivariate data analysis: Maxwell Macmillan International Editions.*
11. Hair, Jr., JF, Black, WC, Babin, BJ, Anderson, RE, Tatham, RL. *Multivariate data analysis (6thEd.)* Upper Saddle River, NJ: Pearson-Prentice Hall; 2006.
12. Hodge, D. R., & Gillespie, D. (2003). *Phrase completions: An alternative to likert scales*. Social Work Research, 27, 45-55.
13. Hoyle, R. H. (Ed.). (1995). *Structural equation modeling: Concepts, issues, and applications*. Thousand Oaks, CA: Sage Publications.
14. Hu &Bentler (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives, *Structural Equation Modeling*, 6 (1), 1-55.
15. Hutcheson GD, Sofroniou N. *The Multivariate Social Scientist*. London: Sage; 1999. Factor Analysis; pp. 224–225.
16. IPCC, 2007: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.Published by the Intergovernmental Panel on Climate Change.
17. Jakobsson, U. (2004). *Statistical presentation and analysis of ordinal data in nursing research*. Scandinavian Journal of Caring Sciences, 18, 437-440.
18. Jamieson, S. (2004). *Likert scales: How to (ab)use them*. Medical Education, 38, 1212-1218.
19. João M. (2014), Google scholar accessed on 16th November by using structural equation modeling for ordinal data. Board of Directors of IAVE, I.P. and Associate Professor of Statistics at ISPA-IU
20. Joreskog, K.G. and Sorbom, D. (1981). LISREL User's guide, Chicago, National Educational Services.
21. Kemp, D. D. (1998). *The Environment Dictionary*. London: Routledge, p. 129. Retrieved
22. Kuzon WM Jr, Urbanchek MG, McCabe S. (1996), The seven deadly sins of statistical analysis. Ann Plastic Surg PP, 37:265–72.
23. Kuzon, W. M. Jr., Urbanchek, M. G., & McCabe, S. (1996). *The seven deadly sins of statistical analysis*. Annals of Plastic Surgery, 37, 265-272.
24. Michael N. (2014), Google scholar accessed on 16th November by using structural equation modeling for ordinal data Professor at Virginia Commonwealth University).
25. Morokoff, P.J., Quina,K., Harlow, L.L., Whitemire,L., Grimley,D.M., Gibson,P.R., and Burkholder, G.J. (1997). *Sexual assertiveness scale for women: development and validation*. Journal of Personality and Social Psychology. 73(4): 790-804
26. Mulaik, S. A., James, L. R., Van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural equation models. Psycho-logical Bulletin, 105, 430–445
27. Rupini.B, Murli.M. Rao and Sushmitha Baskar (2016) "Skill Development in Environmental Sector through Open and Distance Learning using Information and Communication Technologies" International Journal of Multidisciplinary Educational Research, ISSN:2277-7881 volume 5, Issue 5(4),pp 87-98.
28. Tucker, L. R. & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38, 1-10
29. Van Dalen, D. B. (1973). *Understanding educational research: An introduction*: McGraw-Hill.
30. Vigderhous, G. (1977). *The level of measurement and 'permissible' statistical analysis in social research*. Pacific Sociological Review, 20 (1), 61-72.
31. Wheaton, B., Muthen, B., Alwin, D. F., & Summers, G. F. (1977). Assessing reliability and stability in panel models. In D. R. Heise (Ed.), Sociological methodology 1977 (pp. 84-136). San Francisco: Jossey Bass.
32. Wiersma, W. (2000). *Research Methods in Education: An Introducation*: Allyn and Bacon.
33. Winer, B. J., D. R. Brown, and K. M. Michels. 1991. *Statistical Principles in Experimental Design. 3rd ed*. New York: McGraw–Hill

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