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Paradigm Shift from Offline to Online Teaching: Readiness Among Teachers of Higher Educational Institutions

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Abstract
The COVID 19 Pandemic has imposed pressures to all sectors of the country and the education sector has also been imposed for the paradigm shift from traditional physical classroom education methodology to the Online classes. To swim with the flow, the teachers are also trying to rebuild their behaviour towards the online teaching and learning. This paper is intended to develop a Structural Equation Modelling (SEM) of the Teaching Behaviour of the teacher towards the online teaching methods. The present paper deals with the teachers of higher education sector of India only, hence empirical data has been collected from the college and university teachers. This SEM is composed of 9 measurement model with 23 observed variables. The causal effect of three Latent Variables viz. – (a) Traits of the teacher, (b) Situation of the teacher and (c) Background of the teacher on the online teaching behaviour of the teachers has been analysed. It is found that, all the three Causal Variables, impact online teaching behaviour of the teachers. All the three variables together were able to explain around 76 percent variation of the online teaching behaviour of the teachers.
Keywords: *Online Teaching Behaviour, Teacher Traits, Teacher Situation, Teacher Background, COVID 19.*

INTRODUCTION

The outbreak of COVID 19 as pandemic and consequently the maintaining of social distancing leads to the requirement of the change in traditional chalk-talk teaching methodology. In this situation, it is a big challenge to the policy makers to cope up with the situation which is inclusive.

Online education or e-learning could be a logical solution to cope up with this situation. The Indian Government is in the way of allowing universities to offer online degrees which previously was limited to foreign universities only. Now, to encourage and widen the access to higher education, this restriction has been lifted from 20% to offer 100% courses online.

Several initiatives towards the extension of online education system has already been initiated by the Indian Government, even before the outbreak of COVIT 19. Among the initiative towards the online education system SWAYAM, SWAYAM Prabha, National Digital Library, e-Shodh Sindhu, FOSSEE, DIKSHA and the list goes on more than 25 digital initiative of government of India.

However, Inclusiveness of the stake holders of the education system viz. Institution (Management), Teachers and Students in India is in a big question mark. All the stakeholders are trying their own way to manage the crisis.

Even if in the education sector, the focus is on the students, a significant no of teachers is also the sufferer of this pandemic professionally. In the countries like India, in higher education, part-time contractual teaching is very much common in both public and private organisations and this leads to the temporary termination of the teachers (UNESCO IESALC, 2020)

In this circumstance, it is very much necessary for the teachers to make themselves able for paradigm shift from offline to online mode of education. Online education not only in terms of teaching but also in terms of evaluation of students using online tools. It is worth to mention that there were some existing e-learning tools which are being used by massively to cope up with the situation. Such educationists are considerably less than the so-called chalk-talk teachers. It is now become a big challenge to those teachers to transform themselves to deal with the technology driven education.

The higher education colleges and universities, especially in the private sector willing to connect to the students not only for the wellbeing of the students but also to manage the cash flow of the organisation and the payment of the staffs. Thus, the teachers are forced to explore the alternative ways of teaching, even in most of the case, without any training facility from the Institutes.

Rationale of the Study

With this background, this study is a modest attempt to analyse the readiness of one of the stakeholders – Teachers. In this study the higher education system has been considered. The question of this study is - are the teachers of higher studies ready for the paradigm shift from offline to online teaching?

REVIEW OF LITERATURE

As per UNESCO report It is a big challenge of the teachers more than 1.5 billion students are out of school worldwide due to the pandemic (United Nations, 2020).

"The nationwide closures are impacting over 60% of the world's student population. Several other countries have implemented localized closures impacting millions of additional learners" (UNESCO, 2020).

According to the American Council of Education, "the public colleges and universities are facing cost that already dwarf the $7.6 billion in federal stimulus fund that one on their way to these institutions." (American Council on Education, 2020)

KPMG India reports that nearly 37.5 million students and 1.4 million faculty in India could be affected by the crisis. This may also impact future admission and enrolment for Indian universities as nearly 5 million aspiring college applicants explore enrolling in university under uncertain conditions (KPMG International, 2020).

Another aspect of requirement of adopting online teaching methodology in higher education is due to the fact that "international higher education exchange will likely experience long-term effects, including decreasing numbers of students studying abroad, as well as inbound international students and global partnerships with universities." (Mirka Martel, 2020)

"However, going online is not that simple on a continent ..... access to the internet, and poor connectivity, exorbitant costs and frequent power interruptions are serious challenges." (Wondwosen & Damtew, 2020)

There is also a significant scope of online learning system for post COVID days. "Digital learning has led to a reduction in cost and has taken the impact and reach of resources for students as well as teachers to another level." (Singh & Lall, 2020)

However, "... online education has its own limitations too. The main hindrance is the DIGITAL DIVIDE due to the non-availability of high-speed internet in rural and remote areas. The inclusive educational system cannot function keeping the underprivileged out of this exercise." (Konikkal, 2020)

Even with the limitation, the Indian Government "have used the DIKSHA platform to ensure continuity of teacher training at home in a situation where in-person training was not possible. States provided teachers a series of short courses on a weekly basis linked to specific training objectives." (India Report Digital Education : Remote Learning Initiatives Across India, 2020)

Online Teaching Behaviour and its Factor

The online teaching behaviour of a teacher is a multi-faceted variable with the different aspects viz. - (a) Analyzing students and curriculum online, (b) using internet as medium of lecture, (c) preparing teaching tools (like ppts / video) (d) implementation of internet media for learning management (e) Online evaluation of students. (Pimdee & Leekitchwatana, 2019)

The online teaching behavior again depends on three basic factors –

(a) Traits of the teacher: It is the ability of the teacher to work with the computer and internet. The characteristics of self-learning and affection of learning new things of a teacher leads to the positive traits of the teachers in this pandemic situation.

(b) Situation of the teacher: The home environment, environment of the institution and the friend circle are also be helpful to the teachers to move towards the online teaching.

(c) Background of the teacher: however, the computer / technical background of the teachers and experience of online teaching and learning will also be helpful towards the paradigm shift.

Objective of the Study

To find the answer of the research question, the teaching behavior towards the online teaching of the college and university teachers has been analyzed. Hence, the objective of the study is to find the structural relationship between the online teaching behavior and the factors effecting it.

The conceptual Model

With reference of the theoretical base stated above, the effect of Traits of teacher (TT), Situation of teacher (ST) and Background of teacher (BT) on Online Teaching behavior (TB) has been analysed. Hence, the Online Teaching Behaviour (TB) in this study is result variable of which there are three aspects of causal variables – Traits of teacher (TT), Situation of a teacher (ST) and Background of teacher (BT).

The first causal variable, the Traits of teacher (TT) composed of three latent variables – Ability of the teacher (AB), Self-learning (SL) and Affection (AF). The second causal variable, the Situation of a teacher

(ST) composed of three latent variables – Home situation (HS), Institute situation (IS) and Friend circle (FC) and the third causal variable, Background of teacher (BT) composed of two latent variables – Education (ED) and Experience (EX)

Population and Sample

As per All India Survey of Higher Education (AISHE) by the HRD Ministry, the number of male teachers in Higher Educational Institutions is 14,16,299 (India Today, 2019).
Using online Slovin's Sample Size Calculator. Slovin's formula is written as –

$$n = \frac{N}{1 + Ne^2}$$

Where, n = Sample Size, N = Total population, e = Marginal Error.
Here in this study, N = 1416299, e = 0.05 (Confidence Level taken into consideration in this study is 95% and hence the Margin of Error is 5% i.e. 0.05),
Hence, the minimum sample size should be 399.88 ~ 400
A sample of size 400 respondent from the teachers of Government, Private and Government Aided colleges providing higher education is being taken into account in this study.

Research Tool

A questionnaire was formed to collect the data for this study. The questionnaire was converted to the online form using google form and the same has been floated to various platform of teachers - LinkedIn, WhatsApp groups, telegram groups and other contacts. The questionnaire was divided into three sections – The first section is the General Section, comprising of the questions related to the variables like Age, Gender, Organization Type, the second section comprising of the variables related to the result variable and causal variables. To understand the moderation effect of the Pandemic of COVID – 19, the questions related to the same has been asked in the third section. All the measurement variables in section B and Section C of the questionnaire, were measured with the Likert scale of level 5 (Strongly agree, Agree, Neutral, Disagree and Strongly disagree)

Test of Normality

The pre-requisite assumption of Structure Equation Modelling of Normality of the data collected has been tested accordingly. The values for asymmetry (skewness) and kurtosis between -2 and +2 are considered acceptable in order to prove normal univariate distribution (George & Mallery, 2010).
The result of AMOS's inherent assumption of normality is shown in the following Table.

Table 1: Assessment of normality

Variable	skew	kurtosis	Variable	skew	kurtosis	Variable	skew	kurtosis
EX1	-0.709	-0.669	FR1	-0.763	-0.073	SL1	-0.884	-0.291
EX2	-0.211	-1.221	FR2	-0.575	-0.668	SL2	-0.846	-0.378
EB1	-0.234	-1.306	IS1	-0.556	-0.62	AB1	-1.799	1.544
EB2	-0.503	-1.043	IS2	-0.853	-0.142	AB2	-1.009	1.552
PN4	-0.799	-0.27	HS1	-1.081	0.5	TB5	-1.149	0.366
PN3	-0.05	-1.276	HS2	-0.159	-1.204	TB4	-1.7	1.628
PN1	-1.379	1.416	SL3	-1.619	1.273	TB3	-1.649	1.096
PN2	-0.114	-1.345	AF1	-1.839	1.193	TB2	-1.234	0.945
IS3	-0.754	-0.303	AF2	0.003	-1.077	TB1	-1.218	0.871

It is obvious from the above Table that using the benchmark ± 2.0, no items exhibited significant skewness and kurtosis. Hence the dataset is found to be normally distributed.

Test of Outliers

The second pre-requisite assumption of outliers has been tested using AMOS. In this regard, a list of the top one hundred observations, ranked in order of their Mahalanobis distances has been calculated **(Ref. Annexure 1).** To find the outliners it is checked that all the data on P2 is less than 1. A heuristic for determining which observations may be outliers is given by Arbuckle that "Small numbers in the p1

column are to be expected. Small numbers in the p2 column, on the other hand, indicate observations under the hypothesis of normality." (Arbuckle, 1996)
Hence, it is inferred from the randomised observation processes inferred that the significant value not high in the both the significant values 1 (P1) and significant value 2 (P2), so, the data were distributed normally.

Model Identification
An "identified" model is one for which each of the estimated parameters has a unique solution. To determine whether the model is identified or not, compare the number of data points to the number of parameters to be estimated. When the number of data points is greater than the number of parameters to be estimated then the model is "over identified," and the analysis can proceed.
In the model of the study, the notes for the model is as under –

Number of distinct sample moments:	378
Number of distinct parameters to be estimated:	64
Degrees of freedom (378 - 64):	314

Here, the number of data points (=378) is greater than the number of parameters to be estimated (=64). Hence the model is "over identified," and the analysis can proceed.
The structural model is recursive in nature. Here in this study the relationship between latent variables are unidirectional. Hence the structural Model is identified.

Model fit of SEM
The author had also analysed whether model is fit or unfit with regards to the data collected. All The three types of model fit namely Absolute Model fit, Incremental Model fit and Parsimonious Model fit has been tested in this study –
In the initial test model is found to be fit in almost all the measures. However, the scope of some modification of the model was analysed so as to get more perfect result / model fit. The modification indices of covariance have been calculated by using AMOS has been checked, and no further modification is found to be recommended.
The result showed that –
- The chi-square value (=759.821 with 311 degree of freedom) is significant at 0.000
- The value of CMIN/DF is 2.443 (acceptable range is 1 – 5)
- Root Mean Square Error (RMSEA) is 0.094 (acceptable range is 0.05 – 0.1)
- RMR = 0.050 (acceptable range<0.08)
- GFI = 0.908 (marginally acceptable as the acceptable range>0.9)
- AGFI = 0.845 ≈ 0.9 (marginally acceptable as the acceptable range range >0.9)
- PGFI = 0.782 (acceptable range>0.05)
- NFI = 0.823 ≈ 0.9 (marginally acceptable range>0.9)
- RFI = 0.887 ≈ 0.9 (marginally acceptable range>0.9)
- IFI = 0.915 (acceptable range>0.9)
- NNFI (=TLI) = 0.922 (acceptable range>0.9)
- CFI = 0.912 (acceptable range>0.9)
- PRATIO = 0.886 (acceptable range>0.5)
- PNFI = 0.640 (acceptable range>0.5)
- PCFI = 0.720 (acceptable range>0.5)

The result of goodness-of-fit of the model of the study is found to be quite good and satisfactory. Since all the indices meeting or marginally meeting acceptable levels, the overall theoretical structure of this study and the empirical data exhibited favourable goodness of fit.

The Model Validity
The convergent validity and discriminant validity have been tested for the constructs of zero order and also for second order by using AMOS plugins of Gaskination's named Master Validity Tool (Gaskin&Lim, 2016) . The statistics for convergent validity for all the constructs fulfil the minimum requirement as under –

Table 2: Model Validity Measures (Zero Order)

	CR	AVE	MSV	MaxR(H)	TB	AB	SL	AF	HS	IS	FR	PN
TB	0.884	0.806	0.747	0.895	**0.778**							
AB	0.934	0.876	0.551	0.935	0.470***	**0.936**						
SL	0.718	0.877	0.747	0.796	0.664***	0.592***	**0.690**					
AF	0.789	0.725	0.663	0.632	0.657***	0.423**	0.684**	**0.652**				
HS	0.783	0.612	0.463	0.585	0.661***	0.380**	0.764***	1.210***	**0.642**			
IS	0.902	0.754	0.633	0.910	0.613***	0.320**	0.709***	0.713***	0.774***	**0.868**		
FR	0.875	0.778	0.633	0.882	0.629***	0.204*	0.786***	0.621***	0.703***	0.795***	**0.882**	
PN	0.765	0.678	0.439	0.866	0.363*	0.299*	0.389*	0.963**	0.969**	0.468**	0.382*	**0.6**
ED	0.794	0.793	0.638	0.745	0.311**	0.176†	0.414**	0.790***	0.693***	0.278*	0.419***	0.5
EX	0.823	0.699	0.646	0.823	0.427***	0.093	0.533**	0.767***	0.804***	0.467***	0.577***	0.6

Note: Validity Concerns: No validity concerns here
References - Significance of Correlations: † p < 0.100, * p < 0.050, ** p < 0.010, *** p < 0.001

Table 3: Model Validity Measures (Second Order)

	CR	AVE	MSV	MaxR(H)	TB	PN	TOT	SOT	BOT
TB	0.884	0.806	0.747	0.895	**0.778**				
PN	0.765	0.678	0.439	0.866	0.363*	**0.691**			
TOT	0.837	0.745	0.522	0.926	0.900***	0.568**	**0.803**		
SOT	0.892	0.833	0.522	0.900	0.733***	0.643**	0.907***	**0.856**	
BOT	0.891	0.803	0.457	0.897	0.427***	0.660**	0.621***	0.676***	**0.896**

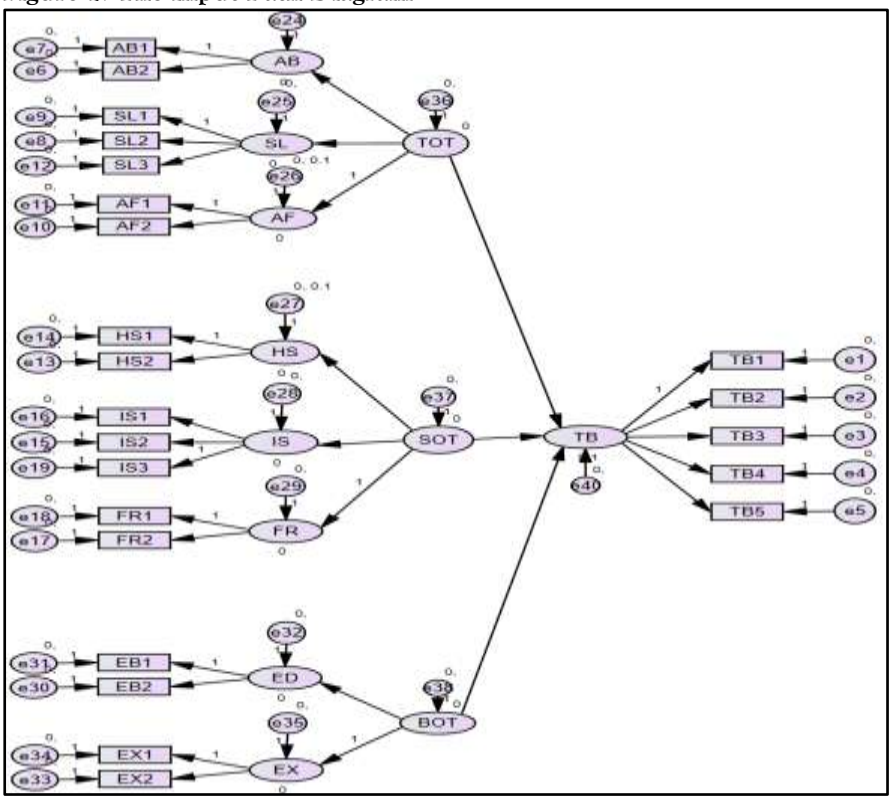
Note: Validity Concerns: No validity concerns here
References - Significance of Correlations: † p < 0.100, * p < 0.050, ** p < 0.010, *** p < 0.001

Construct Reliability (CR) for all the constructs are greater than 0.7
Average Variance Explained (AVE) are greater than 0.5
Construct Reliability (CR) should be>Average Variance Explained (AVE)
The discriminant validity (divergent validity) has also been tested and found upto the marks as under –
Average Variance Explained (AVE)>Maximum Shared Variance (MSV)
Average Variance Explained (AVE)>Average Shared Variance (ASV)
Hence it is concluded that the model is valid and may go for further analysis.

Input Path Diagram

The input path diagram is shown in the following figure. The complete model is composed of 9 measurement model with 23 observed variables. There are 12 latent variables (consists of 9 zero order latent variables and 3 second order latent variables).

Figure 1: The Input Path Diagram



Analysis of Measurement Model

In all the 9-measurement model of the SEM, the indicator variables effects positively on the respective latent variables and all are found to be statistically significant at 1% level. **(Annexure 2)**

All the second order latent variables viz TOT, SOT and BOT have positive effect with their respective indicator variables. These effects are also statistically significant at 1% level. **(Annexure 3)**

Analysis of Structural Model

In the structural model of the study, the relationship of causal variables viz. TOT, SOT and BOT with the result variable TB has been analyzed. It is observed from the table below that all the causal variables effect the result variables positively. The beta values of TOT, SOT and BOT are 0.837, 0.240, 0.060 respectively. However, the impacts are statistically significant for TOT and SOT only at 1% level. The impact of BOT is found to be not significant. The R Squared value of 0.763 implies that 73.3% variance of the online teaching behavior (TB) explained by the three indicators of this study viz. Traits of the teacher (TOT), Situation of the teacher (SOT) and Background of the teacher (BOT).

Table 4: Standardized and Unstandardized estimates of Structural Model

Dimension	Indicators	B	S.E.	C.R.	P	Beta	R Squared
TB	TOT	.958	.142	6.749	***	.837	.763
	SOT	.204	.061	3.359	***	.240	
	BOT	.052	.062	.841	.401	.060	

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CONCLUSION

It is said that COVID 19 brought a "second wind to higher education in India" due to increasing use of technology (ORF Research and Anaysis, 2020). India is now trying to follow the footsteps of UNESCO model of online education and for the same all the stakeholders have to contribute; teachers are one among them. From this study it is found that teachers of the higher studies are ready for the digital transformation with their Traits and Situation. It is a high time to trigger the teachers with necessary training of online teaching methodology. This will lead to an acceleration towards the international standards of higher education in India.

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17. Annexure 1

Results of observations farthest from the centroid (Mahalanobis distance)

Observation number	Mahalanobis d-squared	p1	p2	Observation number	Mahalanobis d-squared	p1	p2
14	81.275	0.000	0.000	22	40.617	0.045	0.000
61	68.638	0.000	0.000	2	40.183	0.049	0.000
111	64.53	0.000	0.000	70	39.744	0.054	0.000
81	63.365	0.000	0.000	92	38.924	0.064	0.000
67	60.895	0.000	0.000	68	38.702	0.067	0.000
53	59.233	0.000	0.000	96	37.139	0.093	0.000
82	55.544	0.001	0.000	88	37.014	0.095	0.000
37	55.082	0.001	0.000	109	36.775	0.099	0.000
105	52.376	0.002	0.000	127	36.765	0.1	0.000
119	51.41	0.003	0.000	128	35.663	0.123	0.000
132	50.997	0.003	0.000	13	35.478	0.127	0.000
12	50.282	0.004	0.000	69	35.376	0.13	0.000
11	49.873	0.005	0.000	17	35.088	0.137	0.000
100	49.564	0.005	0.000	84	34.774	0.145	0.000
74	49.242	0.006	0.000	32	34.386	0.155	0.000
125	47.885	0.008	0.000	52	34.158	0.162	0.000
107	47.789	0.008	0.000	42	33.755	0.173	0.000
126	45.926	0.013	0.000	77	32.95	0.199	0.001
89	45.769	0.013	0.000	71	31.718	0.243	0.016
97	45.017	0.016	0.000	79	31.66	0.245	0.011
113	44.147	0.02	0.000	20	31.642	0.246	0.007
19	42.495	0.029	0.000	133	31.633	0.246	0.004

123	42.121	0.032	0.000	78	31.426	0.254	0.005
86	41.896	0.034	0.000	131	30.871	0.276	0.015
9	40.808	0.043	0.000	7	30.735	0.282	0.014

Annexure 2 Estimates in Measurement Models – Regression weights and Squared Multiple Correlations.

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
AB	AB1	4.448	1.000				.954	.910
	AB2	4.515	.914	.078	11.763	***	.918	.843

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
SL	SL1	4.142	1.000				.404	.163
	SL2	4.172	1.803	.425	4.245	***	.743	.552
	SL3	4.381	1.945	.461	4.224	***	.845	.715

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
AF	AF1	4.448	1.000				.798	.636
	AF2	3.149	.894	.178	5.017	***	.482	.232

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
HS	HS1	4.052	1.000				.590	.348
	HS2	3.216	1.423	.274	5.194	***	.657	.432

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
IS	IS1	3.619	.988	.083	11.906	***	.912	.832
	IS2	3.858	1.096	.083	13.247	***	.852	.725
	IS3	3.761	1.000				.840	.705

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
FR	FR1	3.858	1.000				.913	.834
	FR2	3.933	.876	.077	11.431	***	.850	.722

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
EB	EB1	3.306	1.000				.824	.679
	EB2	3.522	.853	.121	7.055	***	.717	.514

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
EX	EX1	3.679	1.000				.781	.610
	EX2	3.254	1.235	.147	8.418	***	.899	.808

Dimension	Indicators	Intercepts	B	S.E.	C.R.	P	Beta	R Squared
TB	TB1	4.194	1.000				.742	.550

	TB2	4.254	1.072	.100	10.750	***	.849	.720
	TB3	4.358	1.044	.110	9.519	***	.785	.616
	TB4	4.410	.846	.101	8.389	***	.702	.492
	TB5	4.052	1.058	.127	8.317	***	.683	.466

Annexure 3
Estimates in Second Order Constructs – Regression weights and Squared Multiple Correlations.

Dimension	Indicators	B	S.E.	C.R.	P	Beta	R Squared
TOT	AB	.872	.144	6.046	***	.610	.372
	SL	.597	.154	3.888	***	.915	.837
	AF	1.000	Referral Point			.893	.798

Dimension	Indicators	B	S.E.	C.R.	P	Beta	R Squared
SOT	HS	.625	.116	5.365	***	.861	.741
	IS	1.101	.141	7.791	***	.922	.851
	FR	1.000				.862	.743

Dimension	Indicators	B	S.E.	C.R.	P	Beta	R Squared
BOT	ED	.092	.232	.398	.691	.250	.062
	EX	1.000				3.179	.108