

MEASUREMENT OF STUDENT ATTITUDES TO E-LEARNING MATERIAL IN PROFESSIONAL EDUCATION

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Abstract

The use of electronic learning material via electronic media and tools is central to many higher education teaching and learning strategies, but adoption of new technology is sometimes negatively received by staff, although taken up willingly and eagerly by students. Primary data has been collected through five point Likert Scale survey questionnaire to empirically investigate the student attitudes towards electronic learning material in professional courses. The technique of factor analysis is used to group the items/statements. The technique of exploratory factor analysis has been used to find the correlation among variables.

Keywords: *Professional courses, electronic learning material, factor analysis, confirmatory factor analysis*

Higher Education in India: An Overview

According to the report, “*The Shape of Things to Come: Higher education global trends and emerging opportunities to 2020*”, Higher Education is one of the fastest growing sectors globally. This report is drawn up for the British Council by Oxford Economics. It further says that China is set to become the largest higher education system with some 37 million students followed by India with 28 million, the US with 20 million and Brazil with nine million. The report further adds that together China and India dominated global growth in higher education enrolments between 2002 and 2009, accounting for 26 million of the overall increase of 55 million in student numbers during that period. According to the projections for 2020, India’s tertiary enrolment growth is forecast to outpace China’s in the years to come.

The Indian education market has witnessed a series of developments and changes in the past fifteen years, which resulted in a significant increase in market size of the education industry compared to previous years. Commercialization of education has attracted many

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national and international players particularly in the arena of professional and technical education. Private players have taken several initiatives for development of educational infrastructure and quality. Increase in GDP and per capita Income has raised the enrollment ratio in education sector. Growth in service sector revenues and collaborations with foreign universities have also driven the sector's growth.

No doubt, Indian education sector is growing at a fastest pace but the professionals including faculty and administrators are lagging behind both in quantity or quality. This will pose threatening scarcity about the availability of well qualified and trained faculty. The expansion plans announced by the Indian government and entry of many more private and foreign players would further raise the demand for faculty. In the event of shortage of faculty, either the institutions would start compromising on the quality of teaching or projects would be delayed or aborted. However, technology can have a great and paramount influence on the efficiency and effectiveness of teaching-learning process. Tables 1, 2 and 3 have been taken from "*Ernst & young EDGE 2011 Report*" titled, "40 million by 2020: Preparing for a new paradigm in Indian Higher Education". These tables represents the latest scenario of HE sector in India.

Role of E-Learning

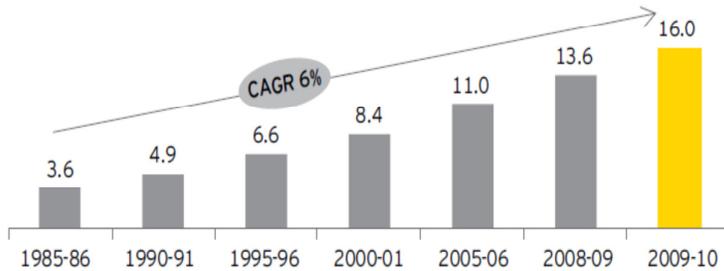
The emergence of new ICT segments like e-learning and V-SAT Training is slowly shifting the Indian education market towards new heights. The growing IT industry in India is also contributing towards the growth of technical education and training. With the help of technology organizations like Educomp Solutions, Everonn Systems and NIIT have been evolved enhanced teaching-learning techniques. Educomp's smart class segment constitutes the largest percentage share in K12 segment. In ICT segment, Everonn contributes major share in terms of revenue growth. NIIT has tied up with various companies for providing training and skills through e-learning.

The concept of eLearning has enormous scope in the field of higher education. As education becomes more competitive and expensive and the Internet becomes more popular and accessible, more and more students are finding ways to overcome geographical barriers. E-learning comprises all forms of electronically supported learning and teaching. The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process. The term will still most likely be utilized to refer out-of-classroom and in-classroom educational experiences via technology. E-learning

Table – 1 showing growth trends in HE Sector in India

- ▶ Enrollments in higher education have grown at a relatively steady CAGR of 6% for over 20 years between 1985-86 and 2009-10
- ▶ Currently, there are ~16 million students undergoing higher education in India, with nearly half of them having joined the system over the last decade

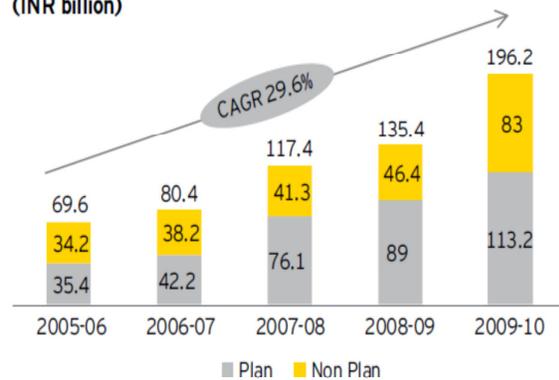
Historical growth in enrollments (in millions) in higher education in India



Increased government spending expected to further support the growth of this sector

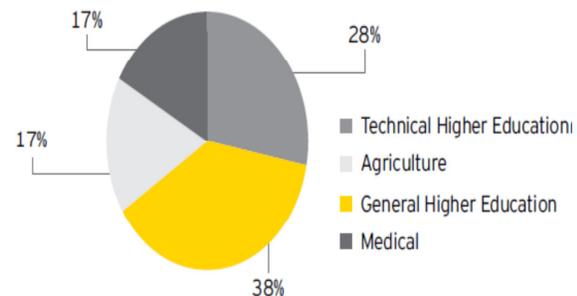
- ▶ State Governments account for a larger share of higher education spending vis-à-vis the Central Government
- ▶ Central Government’s expenditure on higher education has grown at ~30% CAGR in the past five years
- ▶ However it has shown a significantly higher growth rate (45%) in 2009-10 over 2008-09

Total Central Government expenditure on higher education (INR billion)



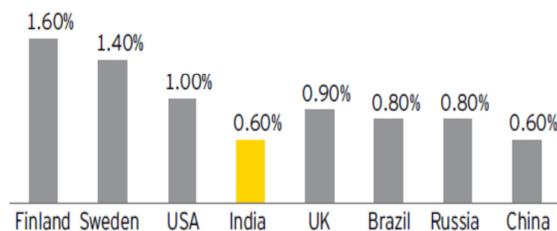
- ▶ The government allocates the largest share (~38%) of its funding for general higher education
- ▶ Further investment is planned via setting up of new institutes:
 - ▶ 16 central universities, 14 innovation universities, 8 IITs and 7 IIMs
- ▶ The total government outlay for higher education has increased from 21% of total education spend in the Xth Five Year Plan to 31% in the XIth Five Year Plan

Central Government spending on higher education (2009)



- ▶ However we believe, India’s public expenditure as a percentage of GDP has a significant opportunity to grow when compared with other countries

Public expenditure on higher education as a percentage of GDP*

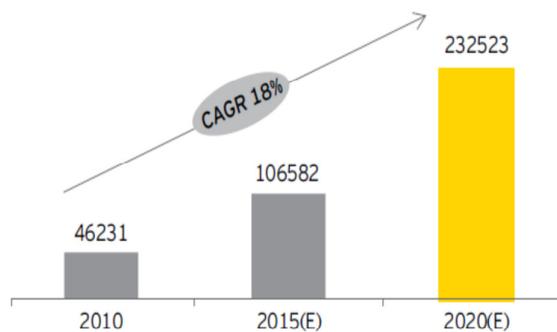


Source: Ernst & young EDGE 2011 Report

Table 2 showing growth of education institutions

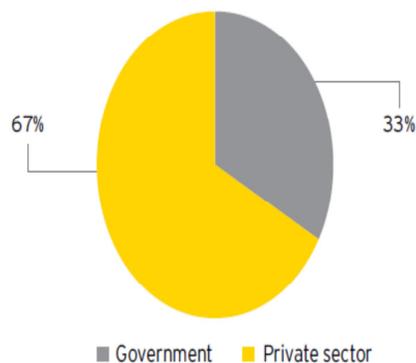
- Spends in the Indian higher education sector are currently estimated to be ~INR 46,200 crores (spends in India), and projected to grow at an average rate of ~18% to over INR 232,500 crores in 10 years

Estimated growth of Indian higher education sector (INR crore)

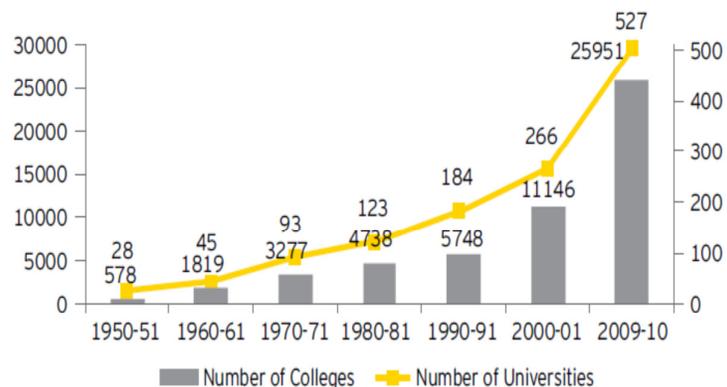


- Private sector accounts for almost 67% of the total spends in the higher education sector
- Growth of higher education has resulted in a sharp increase in the number of institutes
 - Universities have grown at a constant CAGR (5%) over the decades from 1950-51 to 2009-10
 - Colleges in India have grown at a higher CAGR (8%) between 1990-91 and 2009-10 compared to between 1950-51 and 1990-91 (6%)
- Private unaided colleges, which form a significant share of the total number of colleges, are rapidly growing in number

Share of private sector spends on higher education (2008-09)



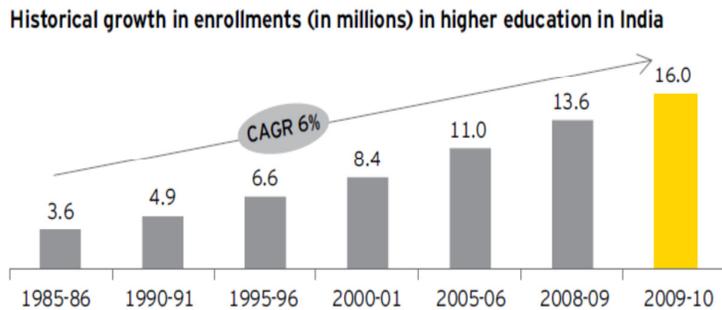
Growth in number of higher education institutes (HEIs) in India



Source: Ernst & young EDGE 2011 Report

Table 3 showing enhanced enrollment and level of public expenditure on HE

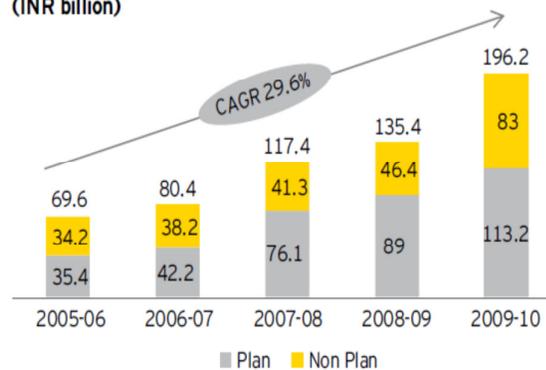
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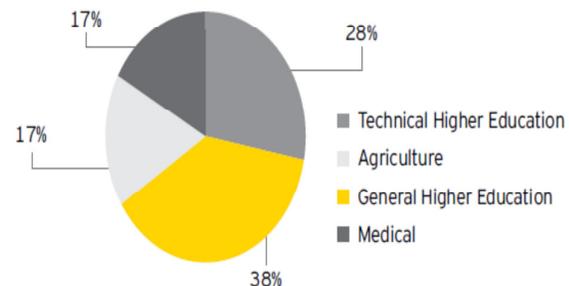
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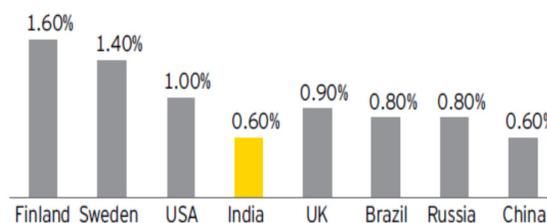
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Public expenditure on higher education as a percentage of GDP*



Source: Ernst & young EDGE 2011 Report

is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered via the Internet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio.

Theoretical framework for the study

E-learning refers to the use of information and communications technology (ICT) to enhance and/or support learning in education. This covers a wide range of systems, from students using e-mail and accessing course work on line while following a course on campus to programmes offered entirely online. Results of few studies have been discussed below.

Hattangdi and Gosh (2012) discuss the relevance of ICT based learning. In their opinion ICT increases the flexibility of delivery of education so that learners can access knowledge anytime and from anywhere. ICT based education is learner centered and better prepares the learners for lifelong learning. ICT also allows the academic institutions to reach disadvantaged groups and new international educational markets. Thus, ICT enabled education will ultimately lead to the democratization of education. Especially in developing countries like India, effective use of ICT for the purpose of education has the potential to bridge the digital divide. However, appropriate measures should be taken to ensure accountability, quality, accreditation and consumer protection in ICT based education.

Sharma (2012) argues that according to a report by the RNCOS, a market research and information analysis company, the market size of higher education in the country will rise at 15 per cent CAGR and will cross US\$ 22 billion by 2013. The report also says that the annual student enrolment in higher education will witness a compounded annual growth rate (CAGR) of 8.7 per cent during 2011-13. It further says that various factors – availability of education loan, growing demand for skilled personnel and e-learning – can act as catalysts for the growth of higher education in India.

Swain et. al. (2011) discusses that the emergence of eLearning has set a new dimension to information seeking and gathering habits of students, teachers, and research scholars. Moreover, adoption of e-learning in higher education has become a mandatory requirement of universities for ensuring much needed promising outputs in studies and research. They further discuss the contextual adoption of e-learning in higher studies, utility of e-learning for quality education in academic ambiance of higher education.

Patil et. al. (2010) supports a blended approach to learning i.e. meaningful integration of face-to-face interactions and e-learning techniques. This approach will be able to make learning process more efficient, easy, socialized, well-organized and Professional. Through this approach, the dream of time relevant, quality assured and student centered higher education for the new Millennium can be realized practically.

Sriram, M. (2010) favours the eLearning concept of education. He explains that according to the MOU between AICTE & NASSCOM, AICTE will serve as a link between Industry and Education for ensuring relevant and quality learning. This aims at strengthening the Indian Technical Education through curricula, faculty, infrastructure, pedagogical improvements in line with the industry's (specially IT) requirements of relevant skill-sets in various disciplines at different levels (graduate, post-graduate, doctoral). Although, E-learning has always been considered useful for only distance learning programs but now-a-days it is catching up fast in the regular pedagogy of education too. E-Learning is the learning experience that is delivered or enabled by electronic technology. The delivery of learning or content can be over the intra-net, extra-net or over the Internet, via CD-ROM, interactive TV, or satellite broadcast.

Nelasco et. al. (2007) opined that Institutes like IITs are adopting all latest technologies and are keeping their students enlightened from various parts of the world. E-Learning has vast potential in India. A major marketing and awareness effort will bring about the desirable change. UGC, NAAC, ICSSR, DBT, NCERT, ICHR, NEEPA, AICTE and other agencies of ISO 9000 family are pushing from various directions to bring the slow growers to walk with the rest. University Grants Commission provides eLearning programs like EDUSAT and INFONET.

Methodology

The study had been conducted in Malout Institute of Management & Information Technology (MIMIT), Malout. The number of students who completed the survey at MIMIT was 270, 120 female and 150 male, their age ranging between 22 to 26 years. All participants have used e-learning facilities in/outside the MIMIT Campus. The students at MIMIT have a range of online and offline eLearning facilities available. The campus is Wi-Fi connected. Furthermore, it has 24X7 hours connectivity of Internet through leased line having the capacity of 6 MBPS provided by Reliance. The center remains open from 9 in the Morning to 11 in the Night to facilitate the students. These facilities include online course materials, online assessments, online library materials, online discussion with peers and instructors, and

E-mail. All the materials are provided to the students in soft form via email on Google Group (for each class) and also on CD ROM format. The e-learning materials were prepared and developed for students using Microsoft Office 2003 applications Word, Excel, and Power Point. So, these digital materials are accessible with or without Internet Explorer. The course materials were lecture slides with and without voice annotation. The content also included technical films and videos on the related course which are available with the MIMIT Library. Power Point was primarily used to prepare the lecture materials. Moreover, In MIMIT Edusat is being used to supplement classroom teaching.

Survey Instrument

A survey questionnaire was used for the purpose of this study using the Likert Scale; 5 “Strongly Disagree”, 4 “Disagree”, 3 “Neutral”, 2 “Agree”, and 1 “Strongly Agree”. A survey instrument employed by Al-Doub, E., Goodwin, R.D., & Al-Hunaiyyan (2008) in their study on, “Students’ Attitudes Toward E-learning in Kuwait’s Higher Education Institutions” was used to conduct the present study. However, some minor modifications were made in the questionnaire to make it easily understandable by the participants. It consisted of 30 items coded as A, B and C. Items coded from B1-B16, A1 to A11 and C1-C3 are related to questions on preparedness to eLearning, benefits of eLearning and issues in eLearning respectively. Full scale survey was carried for 270 responses.

Results

Factor analysis has been performed by examining the pattern of correlations between the observed values. Observed values that are highly correlated (either positively or negatively) are likely to be influenced by the same factors, while those that are relatively uncorrelated are likely to be influenced by different factors. Correlation Matrix serves as preliminary base for conducting FA. One should always consult the correlation matrix to get an initial sense of how variables are related.

Table 7 lays down a preliminary foundation for the significant relationships among variables. The reliability analysis was conducted to determine the internal consistency of items of the survey questionnaire. As per table 5, value of Cronbach's Alpha is 0.810 which is more than the 0.70 of the threshold limit considered adequate for the reliability of the instrument (Cronbach, 1951; Nunnally, 1978). KMO value has been calculated for all the 30 items in table 6. KMO value tells about the proportion of common variance in observed

variables. It is 0.705 in our case which is greater than 0 .50, so we can proceed with the analysis. The Bartlett's Test of Sphericity tells us if the correlation matrix is factorable (i.e., are variables interrelated?). This value is $\chi^2(435) = 5386.861$ $p < .001$ indicating that the correlations within the R-matrix are sufficiently different from zero to warrant factor analysis.

Principal components analysis requires that there be some correlations greater than 0.30 between the variables included in the analysis. Table 6 shows many correlations in the matrix which are greater than 0.30, satisfying this requirement for our data set. PCA was run to find the common set of variables out of total 30 items. Rotated Factor Matrix table 7 contains the rotated factor loadings, which are the correlations between the variable and the factor. Because these are correlations, possible values range from -1 to +1. On the /format subcommand, we used the option blank (.40), which tells SPSS not to print any of the correlations that are 0.40 or less. This makes the output easier to read by removing the clutter of low correlations that are probably not meaningful anyway.

The table 7 shows a rotated matrix of principal components of the instrument suggesting that a 5-factor solution best explained the data. The total variance explained by both the initial eigenvalues and extracted squared loadings was 78.05%, and the five factors individually accounted for 21.975%, 18.086%, 15.290%, 13.110%, and 9.590% of the variance, respectively. This value of 78.05 tells us 78.05% of the variance in the items (specifically the items' variance - covariance matrix) is accounted for by all five components. So, we have reduced the number of items from 30 to 12, reduced the number of components, and yet have improved the amount of variance accounted for in the items by our principal components.

Table 8 shows the rotated component matrix indicating very clearly the emerging five principal components for our dataset. The first four components/factors consist of two variables each and the fifth one comprises four variables. These are given in the said table with their description. These five factors primarily grouped together the most relevant variables as far eLearning teaching material and its use among students is concerned.

Discussion

Further analysis can be conducted to see if results vary for gender. The results can be analyzed separately for school students only because eLearning at school level can encourage learners to gain better edge. ELearning can be further explored by correlating it, either directly or indirectly with enrollment in educational institution for regular and distance

courses. ELearning approach combined with traditional methods of teaching can be further explored to have an impact on students' satisfaction and overall academic growth.

Conclusion

Nowadays a premium is put on intellectual capital. To retain their competitive edge, organizations have started to investigate which training techniques and delivery methods enhance motivation, performance, collaboration, innovation, and a commitment to life-long learning. Same is applicable to educational institutions also. Hence, the use of technology in teaching-learning process can deliver better results both for the educators and the learners. Digital tools can be effectively used to enrich the courseware content with multimedia features Audio, video, graphics, 3D-animation etc. This results in better visualization and better understanding, hence retention of the subject.

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Table 4 Reliability Statistics

Cronbach's Alpha	N of Items
.810	30

Table 5 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.705
Bartlett's Test of Sphericity	Approx. Chi-Square
	5386.861
	df
	435
	Sig.
	.000

Table 6 Correlation Matrix

	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	C1	C2	C3	
B1	1																														
B2	.126	1																													
B3	.251	-.082	1																												
B4	.119	.178	.103	1																											
B5	.132	.077	.015	-.069	1																										
B6	.906	.148	.294	.155	.145	1																									
B7	.248	.122	.104	-.028	.166	.237	1																								
B8	.162	.247	-.065	-.079	.101	.178	.414	1																							
B9	-.017	.217	-.229	-.096	.190	-.004	.377	.443	1																						
B10	.269	.257	-.219	.059	.161	.264	.316	.196	.297	1																					
B11	.085	.073	-.040	-.270	.085	.072	-.023	.161	.205	.297	1																				
B12	.018	-.032	.073	-.081	-.158	-.038	.082	.074	-.071	-.007	.035	1																			
B13	.287	.219	.194	.171	.152	.314	.305	.105	.193	.380	-.036	.205	1																		
B14	.023	.125	-.158	-.258	.093	-.004	.073	.119	.257	.306	.691	.127	-.112	1																	
B15	-.005	.210	-.212	-.074	.197	.008	.388	.422	.967	.303	.200	-.057	.209	.253	1																
B16	.266	.233	.233	-.168	.208	.248	.582	.395	.260	.255	.022	.079	.347	.002	.260	1															
A1	.131	.263	.185	-.105	.077	.094	.135	.221	.126	.016	.031	.174	.110	.046	.132	.341	1														
A2	.049	.129	-.246	-.383	.353	.027	-.003	.274	.197	.319	.207	.008	.092	.123	.188	.264	.131	1													
A3	.087	.148	-.120	-.037	-.053	.083	-.252	-.136	-.050	.368	.280	.185	.245	.212	-.051	-.202	-.004	.164	1												
A4	-.005	.135	-.213	-.052	.177	.017	.317	.373	.900	.280	.220	-.095	.165	.242	.897	.187	.065	.153	-.022	1											
A5	.324	.209	.021	.026	.230	.319	-.048	-.125	-.029	.283	.186	.008	.136	.162	-.026	-.113	-.063	.137	.359	-.003	1										
A6	.087	.275	.151	-.109	.031	.063	.134	.227	.148	.014	.022	.172	.104	.029	.147	.319	.876	.136	.026	.125	-.067	1									
A7	.125	.166	.194	.018	.028	.132	.176	.050	.042	.165	.049	.305	.326	.090	.049	.366	.288	.070	.072	.065	.073	.325	1								
A8	.099	.306	.172	-.083	.037	.075	.124	.229	.152	.025	.049	.190	.121	.055	.157	.329	.920	.129	.031	.128	-.068	.950	.348	1							
A9	.037	.063	.018	-.053	.271	-.007	.176	-.033	.014	.243	.071	.089	.207	.144	.028	.088	.091	.310	.274	-.011	.289	.116	-.076	.116	1						
A10	.156	.129	.334	.046	.235	.160	.379	.131	.241	.104	.155	.035	.221	.191	.273	.255	.396	-.092	-.165	.259	.067	.407	.224	.441	.199	1					
A11	.210	.088	.026	-.019	.079	.194	.403	.054	.150	.385	-.001	.103	.420	.032	.146	.318	.064	-.069	.324	.147	.292	.098	.105	.073	.326	.071	1				
C1	-.092	.047	.192	.032	-.040	-.099	.172	.298	.196	.020	-.064	.028	.249	-.193	.173	.384	.034	.196	-.098	.180	-.164	.069	-.069	.055	.089	-.128	.135	1			
C2	.153	.364	.019	-.074	.112	.143	.386	.364	.286	.294	.148	.008	.253	.118	.272	.314	-.016	.098	-.052	.312	.128	-.001	.106	.000	-.113	.215	.243	.238	1		
C3	.096	.176	.017	-.198	-.031	.061	.191	.149	.115	.036	.085	-.054	.181	-.010	.091	.219	.080	.068	-.067	.110	.027	.063	-.059	.057	-.098	.140	.132	.212	.401	1	

Table 7 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.637	21.975	21.975	2.637	21.975	21.975	2.018	16.820	16.820
2	2.170	18.086	40.061	2.170	18.086	40.061	1.988	16.570	33.390
3	1.835	15.290	55.351	1.835	15.290	55.351	1.959	16.325	49.715
4	1.573	13.110	68.461	1.573	13.110	68.461	1.907	15.889	65.604
5	1.151	9.590	78.052	1.151	9.590	78.052	1.494	12.448	78.052
6	.720	5.997	84.048						
7	.644	5.364	89.412						
8	.577	4.809	94.221						
9	.452	3.766	97.986						
10	.102	.848	98.835						
11	.091	.755	99.589						
12	.049	.411	100.000						

Extraction Method: Principal Component Analysis.

Table 8 Rotated Component Matrix^a

Item Description	Components				
	1	2	3	4	5
B1 I like using resources on web	.955				
B6 I am satisfied with eLearning material	.965				
B15 I already have a PC/Laptop			.961		
A4 Other resources (educational PPTs, Companion book) on the web helped me			.959		
A6 Reading digital notes improves my understanding of course contents		.978			
A8 ELearning encourages me to search for more facts		.977			
C2 I feel eLearning leads to social isolation					.767
C3 I feel eLearning lacks face to face interaction b/w student and the teacher					.855
A3 Lecture with voice on CD, PC and web helped me				.726	
A11 I found eLearning lessons to be sufficient & relevant				.671	
A9 ELearning encourages me to participate more actively in discussion				.713	
A5 ELearning helped me a lot if I couldn't attend the class for any reason				.633	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

Table 9 Component Transformation Matrix

Components	1	2	3	4	5
1	.568	.386	.440	.462	.347
2	-.499	.407	.616	-.427	.153
3	-.108	.792	-.393	.163	-.425
4	-.545	-.206	.259	.744	-.199
5	-.345	.124	-.454	.153	.798

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.