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Evaluating the Effect of Various Parameters Contributing to Knowledge Cycle through SEM

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Abstract: At present, the use of technology alters the classroom dynamics. The ability to marshal thoughts and ideas in a structured manner is feasible through the use of Information and Communication Technology (ICT). In general teaching-learning activity is a cyclic process often called as knowledge cycle. Knowledge cycle consists of knowledge accumulation and enhancement, knowledge delivery and evaluation at the broader level. This paper would provide an insight regarding the various parameters that contribute towards implementing ICT-based knowledge cycle for better efficiency. The other outcome of this paper is to evaluate the parameters contributing to the ICT-based knowledge cycle through Structural equation modelling

Keywords: Information and Communication Technology (ICT), Knowledge Cycle, Knowledge enhancement and delivery

I. INTRODUCTION

ICT (Information and Communication Technology) plays a vital role in present education system. It has become an integrated tool and acts as a catalyst in bringing greater transformation to the knowledge cycle. The knowledge cycle comprises of knowledge enhancement and accumulation, knowledge delivery and evaluation. Integration of ICT mainly enables learners to transcend time and space and overcomes the geographical barriers. In education sector the use of information and communication technologies has been divided into two broad categories: ICTs for Education and ICTs in Education. ICTs for education refers to the development of information and communications technology specifically for teaching/learning purposes, while the ICTs in education involves the adoption of general components of information and communication technologies in the teaching learning process. The integration of ICT in educational process brings in innovativeness in the entire set of processes. ICT continues to benefit all the stakeholders of an education enterprise. This paper focuses on the identification of various factors that contribute to ICT-based knowledge cycle and also to arrive at a SEM-based model to implement ICT to teaching –learning process

II. THEORETICAL BACKGROUND

The ever-growing need for higher education in India demands the exploration of various opportunities. The time is very opportune for India to make its transition to the knowledge economy – the economy that creates, disseminates, and uses knowledge to enhance its growth and development [1]. The study conducted by Raghunath Mashelkar indicates wide opportunities for India to become the world's number one knowledge production center by 2020[2]. Knowledge is a key resource for global competitiveness, and India has an opportunity to convert demographic surplus to economic strength [3]. India has a good presence of young population in the country in the age group of 20 to 25 years. While considering the demographic profiles of developed nations, India has the advantage of becoming a knowledge hub [4]. A right technology–based system could enhance the access and usage of the knowledge resource to the right people on time. Educational systems around the world are under increasing pressure to use the new information and communication technologies (ICTs) [5]. The information society demands a workforce that can use technology as a tool to increase productivity and creativity. This involves identifying reliable sources of information, effectively accessing these sources of information, synthesizing and communicating that information to colleagues and associates [6]. Information is a key resource for teaching, learning, research, and publishing. This brings the need for effective methods of information processing and transmission [7]

The literature review clearly indicates that there are heterogeneous challenges in the quality of Indian higher education and barriers exist in areas such as infrastructure, access, regional disparity, and socio-economic aspects. This emphasizes the need for change in Indian higher education to enhance efficiency. Hence, a technology-based higher education system can help to overcome these challenges. The significance of a knowledge economy in overcoming global competition and the opportunities that exist for India to make advancements in the higher education sector was clearly available through the literature study. ICTs have a great potential to overcome from the challenges of traditional education system. They can overcome geographic, social, and infrastructure barriers to reach populations that cannot normally be served by conventional delivery systems.

The fast–changing, technology-based economy requires worker flexibility to adjust to new demands and the ability to learn new skills. The increasing sophistication of modern societies demands constant updating of the knowledge and skills of their citizens. In this context life-long learning has become mandatory for everyone irrespective of age and

experience. Haddad and Draxier indicated that ICT contributed to effective learning through expanding access, promoting efficiency, improving the quality of learning and improving management systems [8]. ICT is now regarded as an essential utility and has a major role to play[9]. ICT is an indispensable part of the contemporary world. According to various studies conducted, the field of education has certainly been affected by the penetrating influence of ICT worldwide. ICT has made an impact on the present day quality and quantity of teaching, learning and research [10].The introduction of ICT usage, integration and diffusion has initiated a new age in educational methodologies, thus it has radically changed traditional method of information delivery and usage patterns in the domain as well as offering contemporary learning experience for both instructors and students [11].

ICT is an essential work tool of the teacher. It is required to access information and learning resources, prepare lesson plans, deliver their lessons, assign work and respond to their students' scripts and projects, communicate with their peers and supervisors; and perform administrative tasks. ICT-based knowledge administration was mainly introduced to improve the skills of learners and prepare them for the global economy and information society [12]. Various studies indicate that knowledge creation, technological innovativeness, organizational networking and knowledge sharing can support sustained economic growth and social development. It is mainly introduced to improve delivery and access to education. It also enhanced access to learning by all [13], and also the quality of knowledge delivery [14].

The review of literature revealed that Knowledge cycle consists of knowledge acquisition, assimilation and development, delivery and evaluation. These include e-learning, e-library, on-line examination, and evaluation and feedback systems as an integral part. A theoretical model for Knowledge cycle is depicted as follows.

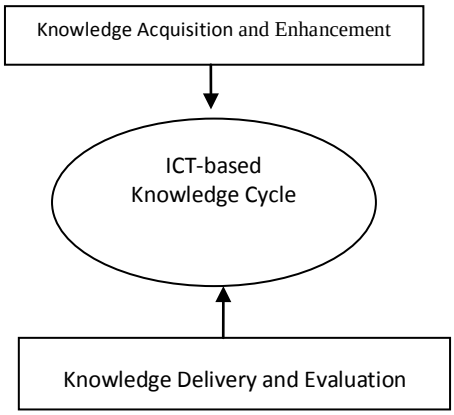

Figure.1 .Theoretical model for Knowledge Cycle

III. METHODOLOGY ADOPTED

This research is mainly focused on AICTE approved higher educational institutions in Karnataka state offering MBA and MCA. The following procedure was followed: Item generation: Content Validity: Reliability test and Criterion Validity Based on the literature review, the functional areas that contribute to knowledge cycle were identified. The population constituted one hundred and sixty six approved higher education institutions offering post graduate programs in management and computer applications in the state of Karnataka. Almost two-thirds (66%) of the total population was selected as a sample which comprises one hundred and ten institutions.

Item generation for knowledge cycle is discussed below. The two major components considered for Knowledge cycle are:

a) Knowledge acquisition and enhancement
b) Knowledge delivery and evaluation

The above-mentioned components were identified through literature review followed by structured interviews with experts. A list of initial items for each construct was generated based on a comprehensive review of relevant literature. Through this study, the various activities that contribute to knowledge acquisition and enhancement by using information and communication technologies were identified. This activity mainly deals with the potential usage of technology in different ways to capture and enhance knowledge in a teaching-learning environment. The other main component identified for Knowledge Cycle includes Knowledge delivery and evaluation. Knowledge delivery deals with various ways in which technology could be used to deliver lectures.

IV. ITEM DESCRIPTION AND CICT VALUE

Table: 1

S. No	Items	CITC I	CITC II
	Knowledge Acquisition and Enhancement		
1	Internet browsing to supplement book information	.590	
2	Going through specialized papers / slides of various authors on the Internet	.750	
3	Access to discussion boards / forums on the Web	.674	
4	Usage of e-mails to interact with other professors/experts to enhance know	.688	
5	Usage of Technology for research work	.674	
6	Existence of Virtual library	.495	
Alpha value of the construct Knowledge Acquisition and Enhancement			**.850**
7	I utilize PowerPoint slides to deliver my lectures	.555	
8	I provide clarification to queries of students through e-mail also	.717	
9	I am able to plan my sessions better using computers	.574	
10	I am able to complete the syllabus on time due to the usage of computers	.503	
S. No	**Items**	**CITC I**	**CITC II**
11	I am able to explain better with illustrations using computers in the classroom	.562	
12	Usage of technology increases my creativity in teaching	.508	
13	Virtual learning (e-learning) is supported	.512	

	for my subject		
14	I encourage students to send their doubts / queries by e-mail or post in discussion boards anytime	.701	
15	I share additional information / latest articles with students through e-mails	.625	
16	On-line tests and on-line quizzes are conducted for the students in my subject(s)	.518	
17	The processing of student's results and performance analysis are done electronically	.518	
Alpha value of the construct Knowledge Delivery and Evaluation			.852

V. IMPLICATIONS

The various items stated for each construct, their respective corrected item total correlation for two iterations and the alpha value for each construct were given in the above table. The Knowledge acquisition and enhancement (KAE) construct was initially represented by six items. The CITC scores for all the six items in KAE construct were above 0.5 except for item 6 which was 0.495. A careful examination of items revealed that item 6 (Availability of Virtual library for enhancing knowledge) was important for the overall construct and the CITC score for this item was 0.495 which is not very low. Due to the high significance of the item, it was decided to retain the item in this construct. Hence, the Knowledge acquisition and enhancement (KAE) construct had six vital items in it and the alpha value of this construct was found to be 0.850.The knowledge delivery and evaluation construct has eleven items which includes the pedagogical factors, interactions, and evaluation etc. The CITC score for all the items in this construct was found to be more than 0.5 and hence none of the items were deleted, reworded or reorganized. The alpha value for knowledge delivery and evaluation (KD) construct was found to be 0.852.

VI. PATH MODEL

A model is a specified set of dependence relationships that can be tested empirically. The purpose of a model is to provide a comprehensive representation of the relationships to be examined. Path analysis is a method that uses simple bivariate correlations to estimate their relationships in a system of structural equations. All relationships in the path diagram can be estimated to quantify the effects between dependent and independent variables even if interrelated [15].

The theoretical model represented in Figure 1 was estimated. The structural equation model estimation was performed using partial least square regression as the estimation technique. Partial least squares are a flexible and extremely powerful technique for the examination of path models with latent constructs measured by multiple indicators. It has been widely used in educational research and specifically in the large international research project conducted by the International Association for the Evaluation of Educational Achievement [16]. Examples of the application of PLS in educational research are provided in many studies [17]. Bootstrapping was chosen as the estimation model which resulted in parametric normal data. Considering the original sample as the population for sampling purposes, the bootstrap samples were built by resampling with replacement from the original sample. The procedure yielded samples consisting of the same number of cases as in the original sample. Bootstrapping was done with a resample option of 500, and this resulted in more reasonable standard error estimates.

The model was estimated and the estimated parameters were saved. The path validity and the relationship between the independent variables and the dependent variable were tested for significance, by checking if the t-statistic was significant with a value more than 1.96 for 95% confidence level. The fit index, R^2 that reflects the predictive power of estimated inner and outer model relationships was observed. R^2 value was examined to study the relationship between the endogenous and exogenous variables in the model. The correlation between the constructs was also examined to study the strength of the relationship between the constructs to evaluate the structural model. The following figure (Figure 2) depicts the tested model along with the R^2 values and t-values: The measurement model and the structural model obtained from the path analysis were analyzed and evaluated. The composite reliability was above 0.55 for all the constructs and the average variance extracted was also more than 0.3. The structural model fit was ensured with the statistically significant values of R^2 (51.2%) and t-statistics, which is further substantiated with the correlation between the various functional areas

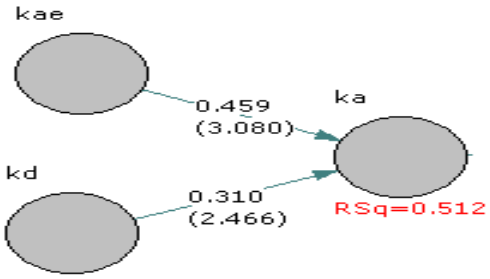

Figure .2 Tested model depicting the effect of various parameters contributing to Knowledge cycle through SEM

VII. CONCLUSION

The research has identified a comprehensive set of functional areas of knowledge cycle. The outcome of this study clearly reveals that there is significant impact of ICT on knowledge acquisition and enhancement. At present ICT is used more for knowledge delivery. There is lot of scope in the future for ICT to be integrated into knowledge evaluation process there by providing more transparency and flexibility into the process.

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