A THEORITICAL STUDY ON ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN HIGHER EDUCATION SYSTEM: A CONCEPTUAL FRAME WORK

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ABSTRACT: *Hyderabad has a long tradition in education dating back to the rule of the British in India. This was also the time when Hyderabad was under the Nizam's rule. During the early 1930s, the Nizam established educational institutions like schools, madras as and colleges. There was only one university during this time and the medium of instruction in all these institutions was Urdu. Today's Hyderabad is the home of leading IT firms and other companies where students can get employment immediately after the end of education. This is the chief reason why the number of applications in Hyderabad institutes increases every year. One of the oldest learning centers of Hyderabad is the Jamia Nizamia. This institute was established as an Islamic seminary of higher studies meant for the studies of only Sunni Muslims in Hyderabad and India. The college that was set up by the Director of Education of the Hyderabad State is functioning as an autonomous body till today. The Osmania University, a popular higher education institute of India was also set up in the pre independence era. With the establishment of this university, came in the practice of British system of learning in India, where learning through crafts was a preferred form of study. Hyderabad hosts a large number of prestigious schools and higher education institutes. Hyderabad institutes have been the alma mater to famous personalities from various walks of life such as former Prime Minister of India P V Narasimha Rao; cricketer V V S Laxman; journalist Haroon Siddiqui, cricketers Mohammad Azharuddin and Venkatapathy Raju.*

Keywords: *Data, Information, Technology, Communication, Educational Institutional, Colleges, Universities, Online Teaching Techniques., Learning, Teaching and Assessment.*

1.0 Introduction:

Information and Communication Technologies (ICT) has become common place entities in all aspects of life. Across the past twenty years the use of ICT has fundamentally changed the practices and procedures of nearly all forms of endeavour within business and governance. Within education, ICT has begun to have a presence but the impact has not been as extensive as in other fields. Education is a very socially oriented activity and quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners. (Sharma, 2011) The use of ICT in education lends itself to more student-centered learning settings and often this creates some tensions for some teachers and students. But with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. This paper highlights the various impacts of ICT on contemporary higher education and explores potential future developments. The paper argues the role of ICT in transforming teaching and learning and seeks to explore how this will impact on the way programs will be offered and delivered in the universities and colleges of the future. (Sharma, 2011) [1]

Across higher education, it is time for a significant reappraisal of assessment strategy, policy and practice through evidence-informed change. This publication has been developed by a group of experts in the field of higher education, working with the Higher Education Academy (HEA) to provide a strong rationale for transforming assessment in higher education, underpinned by an established evidence base. Importantly, this publication also provides an assessment review tool, which offers a practical method to take stock of current practice and look to a targeted approach to strategic change The Higher Education Supplement to the NETP — a separate, complementary document — builds on the principles described in each of the NETP's five sections-- learning, teaching, assessment, and infrastructure-- examining them in the context of the higher education eco- system. It examines the role of technology in serving an increasingly diverse and dispersed stu- dent body that is growing and evolving in size and composition and discusses the various ways that technology can enable system- and ecosystem-wide applications of collaborative solutions to systemic issues of access, affordability, and completion. This 2017 update to the NETP is the first yearly update in the history of the plan. Feedback from the field indicated that the previous five-year update cycle was not frequent enough to account for rapidly changing circumstances and the pace of technology advancement in our schools. It is our intention to continue yearly updates to the NETP(US Department of Education & Office of Educational Technology, 2017)[2]

2.0 Objective of the study

This paper examines some of the issues surrounding student retention in higher education. It is based on the case study of a modern university in England that has good performance indicators of both widening participation (i.e. increasing the diversity of the student intake) and student retention. The two-fold nature of this success is significant, as it has been asserted that greater diversity will necessarily lead to an increase in student withdrawal. Furthermore, changes to student funding in the UK put greater financial pressures and stress on students, especially those from low-income groups.

3.0 Background of the study with survey

Nevertheless, many students cope with poverty, high levels of debt and significant burdens of paid work to successfully complete their courses of study. Drawing on the work of Reay et al. (2001), this paper adopts and explores the term 'institutional habitus', and attempts to provide a conceptual and empirical understanding of the ways in which the values and practices of a higher education institution impact on student retention.(Thomas, 2002)[3]

This study investigates the effectiveness of using e-learning in teaching in tertiary institutions. In institutions of higher education, the issue of utilizing modern information and communication technologies for teaching and learning is very important. This study reviews literature and gives a scholarly background to the study by reviewing some contributions made by various researchers and institutions on the concept of e-learning, particularly its usage in teaching and

learning in higher educational institutions. It unveils some views that people and institutions have shared globally on the adoption and integration of e-learning technologies in education through surveys and other observations. It looks at the meaning or definitions of e-learning as given by different researchers and the role that e-learning plays in higher educational institutions in relation to teaching and learning processes, and the advantages and disadvantages of its adoption and implementation.(Arkorful & Abaidoo, 2015)[4]

Researchers working in educational settings are increasingly paying attention to the role students' thoughts and beliefs play in the learning process. Self-efficacy, a key element of social cognitive theory, appears to be an important variable because it affects students' motivation and learning. This article investigates empirical literature about the role of students' self-efficacy in education by focusing on the following research question: which are the factors shown to affect the self-efficacy of students within higher educational settings? The results of a review reveal that educational programmes have the possibility to enhance students' self-efficacy, and that educational programmes based on social cognitive theory proved to be particularly successful on this score. Several factors appeared to influence students' self-efficacy and provided evidence of the potency of the main sources of self-efficacy. Directions for future research are indicated. © 2010 Elsevier Ltd.(Van Dinther et al., 2011)[5]

Learner-Centered Teaching, Maryellen Weimer contrasts the practices of teacher- centered college teaching and student-centered college teaching in terms of (1) the balance of power in the classroom, (2) the function of the course content, (3) the role of the teacher versus the role of the student, (4) the responsibility of learning, (5) the purpose and processes of evaluation. She then gives some suggestions on how to implement the learner-centered approach. Using Weimer's five specifications, it has been possible to identify from the pedagogical literature several examples where college teachers are seeking to move toward more student-centered classrooms. This essay reports on innovations used by teachers across the academic and professional spectrum, as well as on their evaluations of their successes(Wright, 2011)[6]

An agenda for future higher education research is proposed which incorporates four interconnected elements: changing social contexts; their implications for higher education; mechanisms of interaction between higher education and society; higher education's impact on society. The role of comparative research in investigating these topics is discussed and a set of priorities for future research questions is proposed. © 2008 Springer Science + Business Media B.V.(Brennan, 2008) [8]

This paper is a critical review of some recent literature around the 'literacies of the digital' in schools and higher education. It discusses the question: 'what does the conjoining of the terms "digital" and "literacy" add to our understanding of teaching and learning in higher education'? It explores the continuing role of critical literacy in relation to the idea that digital literacies are transformative for pedagogy in this sector. © 2011 Taylor & Francis.(Goodfellow, 2011) [8]

The research on formative assessment and feedback is reinterpreted to show how these processes can help students take control of their own learning, i.e. become self-regulated learners. This reformulation is used to identify seven principles of good feedback practice that support self-regulation. A key argument is that students are already assessing their own work and generating their own feedback, and that higher education should build on this ability. The research underpinning each feedback principle is presented, and some examples of easy-to-implement feedback strategies are briefly described. This shift in focus, whereby students are seen as having a proactive rather than a reactive role in generating and using feedback, has profound implications for the way in which teachers organize assessments and support learning.(Nicol & MacFarlane-Dick, 2006)[9]

This book is intended to help teachers and college students promote more effective learning through development of critical thinking and reflective learning skills. Part 1 is about theory; it consists of five chapters, which include an overview of the book's themes as well as discussions of learning philosophies and models, learning theories, the requirements for reflection, and reflection and reflective practice. Part 2 is on facilitating learning and reflective .The teaching of Higher-order Thinking (HOT) has its own challenges and these challenges deserve due attention. In the 21st century, one critical aspect in discussing effective teaching and learning is examining the effectiveness of teachers in developing students' capability to think while ensuring content mastery at the same time. The aim to develop and enhance students' HOT has been a major educational goal. As a matter of fulfilling a national aspiration in education, the role of teachers in inculcating HOT is another important aspect of teaching HOT effectively practice. Individual chapters discuss academic practice and learning; developing reflective practice and the teacher's use of reflective dialogue; student use of reflective dialogue; the facilitator's role in enabling reflective learning; basic skills of facilitation; and further skills of facilitation. Part 3 offers exemplars which relate the practice of reflective dialogue to group learning, supervision, and mentoring.(Perideaux, 2001)[10]

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This study examined the extant higher education literature on the development of professional identities. Through a systematic review approach 20 articles were identified that discussed in some way professional identity development in higher education journals. These articles drew on varied theories, pedagogies and learning strategies; however, most did not make a strong connection to professional identities. Further research is needed to better understand the tensions

between personal and professional values, structural and power influences, discipline versus generic education, and the role of workplace learning on professional identities. © 2012 Society for Research into Higher Education.(Trede et al., 2012)[12]

Higher education is a unique intellectual contributor to society's efforts to achieve sustainability, through the practices of skills, consultancies, trainings, and exchange of knowledge. University researchers are the first alarms to alert the environmental challenges, and assist to spearhead a multidisciplinary of technical solutions. Malaysia, endowed with its rich natural resources and diversity recognizes the need to adopt a sound developmental framework to transform the country's educational landscape into a high quality and excellent level. This policy forms the core strategies in moving Malaysia of meeting the needs of human resource development, and creates a pool of highly competent knowledgeable workers. In parallel to this development, both government and non-governmental organizations (NGOs) continue to advocate national efforts to address environmental program for incorporating the sustainability of environmental literacy and conservation of ecosystems. The plan espouses the vision of building a strong and resilient, vibrant and competitive socio-economic development, for the maintenance of sound environmental conditions. The impetus to develop Education for Sustainable Development is accompanied by the integration of environmental protection rules, and boosted by the implementation of Environmental Impact Assessment (EIA). With the aforementioned, the present work describes the historical evolution of environmental higher education in Malaysia. The fragmented policies, central government's roles, and the concept of green campus are elucidated. Besides, the research breakthroughs and joint co-operations as an implementation arm for the promotion of public education and green technology are outlined. © 2013 Published by Elsevier Ltd.(Foo, 2013)[13]

From history to the present day, especially in the field of technology is provided a wide range of developments. The most important of these developments has achieved the realization of the industrial revolution, has led to play a leading role in the production is done by human beings. The effects on production of industry 4.0 emerging with this mind is very important. The qualified employees should be trained to make the necessary preparations for the company in this period, it is experiencing the fourth industrial revolution. Therefore, the impacts on higher education of industry 4.0 are examined in this paper. The importance in education of industry 4.0 has revealed with statistical data presented in this study.(Baygin et al., 2016)[14]

Student engagement has become problematic following the rise of mass and universal forms of higher education. Significant attention has been devoted to identifying factors that are associated with higher levels of engagement, but it remains the case that the underlying reasons for student engagement and, indeed, the notion itself of 'student engagement' remain weakly theorised. In this article, we seek to develop the theoretical basis for student engagement in a way that highlights the student's own contribution. We explore how learning involves students taking responsibility for action in the face of uncertainty, whether in pursuit of personal or communal

concerns. Drawing on perspectives primarily from realist social theory, we suggest that student engagement may be shaped by extended, restricted and fractured modes of reflexivity and co-reflexivity. In this way student engagement in higher education is theorised as a form of distributed agency, with the impact of a learning environment on this agency mediated by reflexivity. Reflexivity itself is further influenced by the tasks and social relations encountered by students in a given learning environment. The role that social relations play in students' responses to learning specifically offers a means to strengthen the moral basis for education. Our account provides an explanation as to why specific educational practices, such as those termed 'high impact', might lead to higher levels of student engagement within the wider context of a knowledge society. We thus offer insights towards new forms of educational practice and relations that have the potential to engage students more fully.(Kahn, 2014)[15]

This study investigates the effectiveness of using e-learning in teaching in tertiary institutions. In institutions of higher education, the issue of utilizing modern information and communication technologies for teaching and learning is very important. This study reviews literature and gives a scholarly background to the study by reviewing some contributions made by various researchers and institutions on the concept of e-learning, particularly its usage in teaching and learning in higher educational institutions. It unveils some views that people and institutions have shared globally on the adoption and integration of e-learning technologies in education through surveys and other observations. It looks at the meaning or definitions of e-learning as given by different researchers and the role that e-learning plays in higher educational institutions in relation to teaching and learning processes, and the advantages and disadvantages of its adoption and implementation.(Arkorful & Abaidoo, 2015)[16]

As Information and Communication Technologies (ICT) gradually permeate daily life, they are profoundly changing the way education is conceived and delivered. Teachers play a key role in this transformation process; their beliefs, pedagogical practices, and teaching skills are continuously challenged. To be used as a lever for pedagogical innovation and institutional transformation, teacher ICT competencies need to go beyond skills in ICT use per se, and enclose contextual knowledge about technology, pedagogy, and content. On the other hand, learners' engagement with ICT in education depends on their expectations and conceptions of learning and required assessment. A learner's experience with ICT in education is linked to his perception of systems' ease of use and usefulness in achieving learning goals. Adaptive learning systems open new potentialities for a personalized instruction which is tailored to the learner's characteristics. At the edge of a new era, schools, colleges, and higher education struggle to seize opportunities and overcome obstacles.(Assar, 2015).[17]

This paper attempts to highlight the role of ICT in higher education for the 21st century. In particular the paper has argued that ICTs have impacted on educational practice in education to date in quite small ways but that the impact will grow considerably in years to come and that ICT will become a strong agent for change among many educational practices. The paper suggests

that ICT in higher education is not a technique for educational development but also a way of socioeconomic development of the nation.(Dr. Y. Rajasekhar, 2012)[18]

The use of ICT in education has intensely reformed learning and teaching processes. Furthermore, it has expanded new opportunities for learning and accessing to educational resources beyond those traditionally available. In this condition, the use of ICT in education creates a method of training called E-learning. This paper attempts to investigate advantages, disadvantages, conveniences and limitations of applying ICT in conjunction with E-learning to agricultural students. The paper accentuates the role of ICT on Iranian students in Agricultural Higher Education in particular.(Talebian et al., 2014)[19]

The term technology-enhanced learning (TEL) is used to describe the application of information and communication technologies to teaching and learning. Explicit statements about what the term is understood to mean are rare and it is not evident that a shared understanding has been developed in higher education of what constitutes an enhancement of the student learning experience. This article presents a critical review and assessment of how TEL is interpreted in recent literature. It examines the purpose of technology interventions, the approaches adopted to demonstrate the role of technology in enhancing the learning experience, differing ways in which enhancement is conceived and the use of various forms evidence to substantiate claims about TEL. Thematic analysis enabled categories to be developed and relationships explored between the aims of TEL interventions, the evidence presented, and the ways in which enhancement is conceived. © 2013 © 2013 Taylor & Francis.(Kirkwood & Price, 2014)[20]

This study proposes that the quality of the teaching and learning process plays a significant role in determining the impact of information and communication technologies (ICT) competence on university success. Drawing from resource theory and educational literature, the authors develop the notion of the quality of the educational operation process as a construct of five variables: ICT satisfaction, ICT attitude, ICT use, ICT culture and ICT directions and routines. Considering the quality of the educational operation process as a mediating variable between ICT competence and university success they present their conceptual model in order to achieve a better understanding of the problem. We also propose a set of three propositions to test in future research.(Romaniello et al., 2010)[21]

This article reports three related studies which investigate how undergraduates use and think about information and communication technologies (ICT) in the context of learning at university. Data were obtained via questionnaires, computer diary records and focus group discussions. The studies were intended to help universities decide how to incorporate ICT into student learning, how the cost of equipment should be shared between students and institutions, and how university provision should be organised to best fit student needs, attitudes and perceptions. Presentation of the results from the studies is followed by a discussion, which attempts to draw out the practical implications of the evaluation evidence for university policy-makers.(Breen et al., 2001)[22]

The advent of Information Communication Technology (ICT) has empowered both learners and teacher with capabilities to reach and resource beyond physical borders. This paper presents the findings of research from Oman into the issues regarding the role of e-governance in higher education especially incorporating ICT technologies. The paper looks into the Vision 2020 statement for strategic goals, while analyzing the Census 2003 data for trends and direction of higher education in the local region. A set of strategic issues in the practical implementation of e-learning in higher education through e-governance is presented along with coverage of ICT policy framework. The focus areas would be capabilities of e-learning mode enabled by ICT technology and its implications in the region, Oman market trends, current levels of literacy, legal framework, nation-wide digital library, public services online and citizen awareness. The paper concludes with strong recommendations both at National and Institutional levels for serving as guidelines in paving the path for their directions in future.(Sridhar, 2005)[23]

This is the introductory article to the monograph "Redefining the Digital Divide in Higher Education". The article describes a comprehensive approach to the phenomenon of the digital divide and digital access, based on Marc Raboy and Mark Warschauer's research. This approach depicts the evolution from mere physical access to effective use of information and communication technologies in the field of higher education. Within this framework, the articles in the monograph are presented highlighting their role in contributing to a comprehensive approach and reflection on the digital divide in Higher Education.(Peña-López, 2010)[24]

Current trends suggest that people seek to learn and to study in flexible environments; therefore, virtual education in higher education plays a fundamental role to meet this trend. The aims of this study are: first, to descriptively examine the potential of virtual education, second, to use Chickering and Gamson (1987) good educational practices model to compose virtual activities, and third to determine the impact of these practices in teaching and learning. The study was conducted with the teacher and 10 students enrolled in a class named Model and Simulation of Dynamic Systems from the Master of Sciences in Information and Communication Technology at Universidad Tecnologica de Panama. This is a descriptive study, and the results show that both the teacher and his students favorably evaluated activities that consisted of using good educational practices, through virtual education. Therefore, this type of strategy for virtual education planning and curriculum design provides positive results. However, as the authors acknowledge that the sample is limited (n = 10), further studies with larger samples are required in order to collect more data.(Durán et al., 2015)[25]

Previous studies have shown that in the higher education sector, information and communication technology (ICT) provides the impetus for change from the traditional concepts of teaching and learning, as well as prime motivation behind the change in scholarly and professional activities. This underscores the importance of ICT in higher education in achieving the goal of providing flexible teaching and learning environments. Consequently, the aim of this study was to answer the empirical question as to what environmental, technological, organizational and individual

factors are most likely to influence choice behaviour to use ICT in student learning in Kenyan higher education. Path analysis statistical techniques in structural equation modelling were used. The findings show that environmental, technological, organizational and individual factors play a significant role in ICT diffusion and infusion. It was further observed that the effects of some factors including availability of ICT, access to ICT, and the characteristics of the institution's chief executive officer play a pivotal role in ICT diffusion in a developing country context. This study produced useful insights into the factors that influence technology acceptance decisions by students, and provided new ideas for the management of ICT diffusion and infusion. © 2012 Society for Research into Higher Education.(Macharia & Pelser, 2014)[26]

4.0 Information and communication technology in higher education in India: Challenges and opportunities

Higher education is approaching the point at which Science and Technology particularly Information and Communication Technology (ICT), plays a vital role in nearly all phases of the educational process. The Internet has emerged as a major driving force of this dynamic development of Information and Communication Technologies (ICTs) which has impacted positively in virtually every sector of the Nigerian economy. In the education sector, tertiary institutions use computers in their academic programs in order to produce good quality of research output and learning. This paper focuses on how ICT diffusion has impacted the higher educational sector positively in Nigeria. The research also exposes the effect of ICT diffusion on undergraduate and postgraduate students of Nigeria's tertiary institutions. A combination of observation, interview and document materials for data gathering was employed as methodology for carrying out this research. The result of the research suggests that ICT is becoming a driving force for educational reforms and that ICTs have become an integrative part of national education policies and plans in Nigerian tertiary institutions.

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5.0 Results and discussions

The students were asked to specify the time they devote to internet daily which 58.33% reported for 1-2hrs, 16.66% for half hr and more than 2 hrs on a daily basis and 8.33% occasionally [Table/Fig-3]. 41.26% of students agreed that technology can replace textbooks in coming years. The reasons put forth are categorized into; 1) Technology as user friendly, 2) Techno savvy generation 3) Vast information available 4) Technology being interactive & personalized and 5) Environment friendly. However 55% students did not support the idea and emphasized that text books cannot be replaced because; 1) they are more reliable and give authentic information, 2) there is no dependence on electricity and 3) Unavailability / inaccessibility of technology [Table/Fig-4] is a limiting factor. 84% of students agreed that in our institute technology is being utilized optimally, 14 % felt that more graphics and animation should be added in T/L activities. One important comment was that laptops should be allowed in classrooms [Table/Fig-5]. The disadvantages of technology as a learning resource material is categorized into 1) Vulnerability to misuse, 2) Unreliable resource of information and 3) Technology/electricity failure. Few students emphasized its unreliability as an information source since it can be edited by anyone [Table/Fig-6]. The students were asked to specify the time they devote to internet daily which 58.33% reported for 1-2hrs, 16.66% for half hr and more than 2 hrs on a daily basis and 8.33% occasionally [Table/Fig-3]. 41.26% of students agreed that technology can replace textbooks in coming years. The reasons put forth are categorized into; 1) Technology as user friendly, 2) Techno savvy generation 3) Vast information available 4) Technology being interactive & personalized and 5) Environment friendly. However 55% students did not support the idea and emphasized that text books cannot be replaced because; 1) they are more reliable and give authentic information, 2) there is no dependence on electricity and 3) Unavailability / inaccessibility of technology [Table/Fig-4] is a limiting factor. 84% of students agreed that in our institute technology is being utilized optimally, 14 % felt that more graphics and animation should be added in T/L activities. One important comment was that laptops should be allowed in classrooms

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S. No	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Responded
1	You are well versed with use of technology		3.17	25.3	46.03	23.8	1.58
2	Technology is user friendly and effective in providing useful information		3.17	7.93	46.03	42.85	
3	You are aware of authentic websites from where you can get desired information about your medical subjects	3.17	9.52	26.98	38.09	19.04	3.17
4	You prefer searching web rather than going to text books	6.34	19.04	33.33	22.22	17.46	1.58
5	You prefer text books for reading rather than searching web	1.58	4.76	34.92	36.5	20.63	1.58
6	Its fun to read medical subjects textbooks		6.34	26.98	33.33	28.57	1.58
7	Its fun to surf internet for ready information about medical subjects	4.76	9.52	15.87	34.92	31.74	1.58
8	You prefer to sit in digital library during free hours	3.17	14.2	25.3	38.09	19.04	1.58
9	You prefer to sit in central library during free hours	3.17	3.17	50.79	26.98	12.69	3.17
10	Whatever is taught in classroom is available on internet	4.76	9.52	23.8	41.26	19.04	1.58

6.0 Conclusions

It is evident from the study that use of ICT in education is increasing very rapidly in various states of India. One of the most common problems of using Information and Communication Technologies (ICTs) in education is to base choices on technological possibilities rather than educational needs. In developing countries where higher education is fraught with serious challenges at multiple levels, there is increasing pressure to ensure that technological possibilities are viewed in the context of educational needs. The use of ICT in education lends itself to more student-centered learning settings and often this creates some tensions for some teachers and students. But with the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important and this importance will continue to grow and develop in the 21st century. ICT integration in the educational process can significantly enhance traditional courses and Internet-based education, i.e., e-learning, is becoming a serious alternative to traditional, face-to-face courses.

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