International Journal of Computational Research and Development (IJCRD)
Impact Factor: 4.775, ISSN (Online): 2456 - 3137
(www.dvpublication.com) Volume I, Issue I, 2016

SECONDARY SCHOOL TEACHERS' DIGITAL LITERACY AND USE OF ICT IN TEACHING AND LEARNING

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Cite This Article: Dr. S. N. Vijaya Kumari & Flavia D'Souza, "Secondary School Teachers' Digital Literacy and Use of ICT in Teaching and Learning", International Journal of Computational Research and Development, Volume 1, Issue 1, Page Number 141-146, 2016.

Abstract:

The rapid growth in the field of Information, Communication and Technology (ICT) in the past decade has highly influenced the teaching-learning process in Secondary Schools. In addition, student life too now-a-days is incomplete without technology around them. Be it in urban or rural parts of India, learning is no more time-bound and place-bound both for teachers and students in the presence of digital devices and internet. However, the challenge of today's educators is to exploit such intimacy of students with technology devices to develop constructive learning in students. For successful integration of ICT in secondary schools, the need for teachers themselves to be digitally literate is imperative. With this focus, the present study aimed to find the Digital Literacy level of teachers and the use of ICT by teachers in teaching-learning process among Secondary Schools in Mangaluru Taluk. Besides comparing the Digital Literacy of teachers and ICT use in teaching-learning among Urban and Rural schools of Mangaluru Taluk, the study also aimed to find relationship between the two variables. Two questionnaires namely, Digital Literacy Inventory and ICT Use in Teaching-Learning were administered to in-service secondary school teachers teaching Karnataka State Syllabus in various schools of Mangaluru Taluk. The findings revealed that the Digital literacy level of Secondary School teachers as well as the extent to which ICT is used by teachers in Secondary Schools is average. There is no significant difference between both Digital Literacy and ICT use of teachers in rural and urban schools. Also, there exists positive relationship between Digital Literacy and ICT use of teachers. Findings provide vital information on present status of Digital Literacy and ICT use of teachers. Further, paper provides educational implications which assists in undertaking suitable initiative to further enhance ICT infusion into teaching-learning in more innovative ways.

Index Terms: Digital Literacy, ICT Use, Teaching And Learning, Secondary Schools & In-Service Teachers

1. Introduction:

We are living in a constantly evolving digital era. Present students, also called as 'Digital Natives' grow up using technology like computers, internet and mobile phones constantly from their early years of life. Due to this early exposure to technology, students today think, communicate, seek help, learn and access information differently. For this reason, it has been observed that the digital natives need to be taught in a fundamentally different way. Learners get accustomed to using technology to solve most repetitive tasks in much easier ways, which earlier formed the basis of traditional learning. Hence, it is inevitable for educators to move from traditional teaching methods to more innovative and techno-enhanced teaching and learning.

Secondary Education in India has constantly faced challenges of providing quality education to the student community. The development in the field of Information and Communication Technology (ICT) has paved way to new and innovative possibilities in teaching and learning. The focus of education has changed from the lecture method of teaching to exploratory methods of learning. Lessons are no more teacher-centered but are more learner-centered. Constructivism, the new paradigm of teaching-learning is the "talk of the town" and is said to be well implemented in the class with appropriate use of ICT. As the technology becomes more rooted in our culture, the demand for in-service teachers to become more tech-savvy increases.

Teachers are expected to provide learners with appropriate and contemporary experiences that allow them to successfully engage with digital technology and prepare them for 21st century skilled life after school. Hence, to cope up with the current demands of 21st century student community and techno-enhanced teaching-learning process, the teachers need to get digitally upgraded. Every teacher who is digitally literate aids in providing the learner community with the abilities and technically innovative skills to achieve global standards in digital world. It is the need of the hour to initiate effective teaching and learning process simultaneously by using latest ICT tools and web-based collaborative learning with global community. In the light of these demands, this paper explores the Digital Literacy level of teachers and use of ICT by teachers in teaching-learning process among Secondary Schools in Mangaluru Taluk.

2. Digital Literacy:

Digital Literacy is defined in various ways depending on the use of ICT. The Digital Saksharta Abhiyan (DISHA) or National Digital Literacy Mission (NDLM) Scheme initiated by our Prime Minister Mr. Narendra Modi defines Digital Literacy as the ability of individuals and communities to understand and use digital technologies for meaningful actions within life situations. Past researchers have defined Digital Literacy

as the combination of a number of complex and integrated sub-disciplines – comprised of skill, knowledge, ethics and creative outputs in the digital network environment (Calvani, Cartelli, Fini and Ranieri, 2008; Covello, 2010). Having secondary school in-service teachers of Mangaluru Taluk at the focal point of this study, Digital Literacy in school pedagogy can be defined as the minimum knowledge and ability of the secondary school teachers to use digital technology, communication tools or networks to locate, evaluate, use and create information in order to enhance the learning experience of students and prepare them to face the future global demands. Thus, digital literacy is more than just embedding technology into lesson plans; it's about using technology to understand and develop modern communication, to locate oneself in the digital space and to manage knowledge and experience in the age of information for the benefit of students.

Computers, mobile phones and tablet are the three major digital devices more often used in the pedagogy. Digital literacy considers the following components:

- ✓ Minimum knowledge of computer hardware and software used in teaching-learning. (E.g., Microsoft Office - Word, Excel, PowerPoint).
- ✓ Knowledge the use of internet on computers, mobile phones or tablets.
- ✓ The ability to directly access information from the wide world of information online.
- ✓ The ability to critically think and evaluate the information by comparing the information available online to check for the authenticity of the information.
- ✓ Knowledge of cultural and social ethics which is termed as E-safety.
- ✓ Collaboration and communication with students and professional experts enabling teachers to keep abreast of the current trends of education.
- ✓ Creative use of ICT in the teaching-learning process facilitating students to engage themselves in independent learning and development of higher order thinking skills.

There are various reasons why digital literacy is important to teachers.

- ✓ Revised Bloom's taxonomy categorizes applying, analyzing, evaluating and creating as higher order thinking skills. Digital literacy facilitates teachers to develop students' higher order thinking skills by suitably choosing students' tasks in the classroom. It facilitates teacher to teach students how to think beyond Google for information access, how to evaluate the source of information and how to draw strong conclusions from the set of information obtained from various websites, thus pushing students to higher levels of creativity.
- ✓ Digital Literacy allows teachers to promote Digital Citizenship in students; thus teaching them the effects of plagiarism and cyber bullying. This in turn allows students to think originally and creatively in their academics.
- ✓ Not all students in a single classroom are of same abilities and skills. Using multimedia and ICT, differentiation in teaching and learning can be best implemented. Digitally literate teachers can appropriately design their learning activities with the help of ICT giving equal importance to both gifted and under-achievers. They can design the learning activities appropriately according to the thinking and learning style of students.
- ✓ Digitally upgraded teachers can make innovative attempts to enhance their lessons by expanding the conceptions of digital world like using Social media, Instagram, Blogs etc.
- ✓ Although, most schools in India are provided with Computer systems from the Government to be used in the classrooms, they are not suitably used for the enrichment of students for various reasons. Thus, teachers who are well versed with ICT usage in classrooms can easily step forward to close the Digital Divide, where in all students who have no access to computers and internet can have an access to it and get benefited from it.

3. Use of ICT in Teaching-Learning by Teachers:

ICT includes both hardware and software. About a decade ago, hardware and software such as radio, television, motion picture, projector, camcorders were considered as ICT tools. In present days, hardware and software like computers, net books, mobile phones, MPS, e-book readers, personal digital assistances, interactive white board, e-mail, video conferencing etc are considered (Omoniyi & Quadri, 2013). Primarily, students are most benefited from the use of ICT in classrooms. Children are said to learn the digital skills as part of their lives, like language, which they learn without realizing they are learning it. (Andersen, 2002). Technology when introduced into classrooms motivates students in their learning due to their familiarity and enjoyment in innovative learning and the ease of use with various technological mediums. ICT allows students to learn according to their personalities, in their own thinking and learning styles. Students of various abilities can be easily catered at a time in the ways in which a single teacher could not, in traditional classrooms. ICT allows students to utilize and manipulate media to create their own meaning of the concepts to be learnt. Using ICT allows students to easily share the information to other students, teachers and experts, so that learning is no more time and place bound. ICT if taught to use appropriately, develops creativity and higher order thinking skills in students which are most essential skills in 21st century.

There are various purposes for which teachers can use digital devices in teaching and learning process. Luehrmann (1972) has proposed five roles of using digital devices in teaching-learning, especially for computers which can be now extended to mobile phones and tablets due to similar use; namely, Learning About Computers (computer awareness and computer literacy program); Learning From Computers (computers used either to tutor a student e.g., tutorial software or to provide additional practice on specific skills e.g., drill-and-practice software); Learning With Computers (student makes decisions about how to interact using the computer, within a simulation or game or problem solving, or using computer as a tool to shape information that is already exits); Learning About Thinking With Computers (computer used to help students develop new patterns of thinking that may assist them in many different learning situations using programming languages); Managing Learning With Computers (indirect use of computers in student learning – maintaining student profile, record keeping, diagnostics and remediation, communication). Bhalla (2013) provides a comprehensive description of the application of computer for instructional purposes in both instruction and management of teaching and learning process, which includes CAL (computer-aided learning), CMI (computer-managed instruction), and CAI (computer-assisted instruction). CAL is a mode of instruction that employs the use of computer in mainly three ways - Whole Class Instruction; Teacher-Directed Student Assignments and Teacher's Self Learning. CMI employs use of computer in instruction-related tasks such as material generation, lesson plan preparation, schedule preparation, attendance monitoring, student's performance assessment, individualized education plans preparation, student reinforcement, communication. The CAI uses instructional software that can be used for tutorial, drill-and-practice, simulation, instructional gaming and problem solving. Thus, digital devices find a wide range of utility in pedagogy.

4. Literature Review:

To analyze the research perspective of present study and the present status of ICT use in teaching--learning, an in-depth analysis of related literature was conducted. It was seen that Government of Karnataka under the Directorate of Public Instruction has undertaken various initiatives to improve computer education and computer based education using schemes like “Mahiti Sindhu” Program in 2000-01, Revised CLASS Project and the Eleventh Finance Commission Project in 2003-04, ICT @schools scheme in 2007-2008 etc. These schemes provided ICT infrastructure (internet, projector, ICT lab) in most government schools of Karnataka and made available trained instructors in all schools. But over a period of time the system deteriorated due to lack of direct monitoring and communication mechanism between the schools and project centre, lack of training to many more teachers and less software that could be directly implemented by teachers in schools.

Nagarajan, Velmanirajan & Kanna (2013) assert that the field of ICT is fast growing in India; hence, both teachers and students need to keep in pace with this fast growth. Since teachers shape the classroom instruction, their primary concern must be to develop the fullest potential of all students, affording them opportunities to pursue variety of avenues. Hence, the need for instructors is to model the new pedagogies and tools for learning by integrating the ICT into classroom instruction with the aim of enhancing the teaching-learning process. Since most pre-service teachers face technology enhanced classrooms, digitally updated students and online official interaction with departments and education systems in their employed schools, Milton (2013) suggests that it is important to provide the new pre-service student teachers proper digital training to face the upcoming professional challenges. A study conducted by Sangràa & González-Sanmamed (2010) found that ICT in teaching favors several teaching and learning processes and that the improvement of teaching-learning processes is higher in schools that have integrated ICT as an innovation factor. He suggests that, to obtain maximum fruit of ICT usage, there is a need for teachers to modernize the technological tools and change the teaching models. Collectively, this proves that digital literacy plays an important role behind a successful teacher.

A review conducted on the effectiveness of integration of ICT in pedagogy in contrast to conventional teaching showed that computer-related technologies change the teaching-learning process rapidly in school levels improving the student achievement and creating learning environments which are more interesting, effective and interactive (Kumar & Singh, 2013; Kaur 2014; Anboucarassy, 2010; Patil, 2011). Appropriate and effective use of technology make students independent learners increasing student motivation, active participation in learning, gain in in-depth information according to their interest and capability, enhanced creativity, improved memory retention, deep understanding, collaborative learning, individualized learning and self-paced learning (Kumar & Singh, 2013; Mehar & Kumar, 2013; Mirji & Gaddi, 2013; Patil, 2011; Nagarajan, Velmanirajan & Kanna, 2013). Use of ICT has found to develop scientific spirit and scientific attitude of students in problem solving environment (Patil, 2011; Nimavathi, 2013; Singh & Gurdel, 2013). Krishnan & Phalachandra (2010) identify the ingredients of blended learning as live events, self-paced learning, collaboration, assessment and performance support. Using video-based instructional programmes, Reddy & Ramar (1998) have found tremendous increase in the rate of progress in slow learners. Nagarajan, Velmanirajan & Kanna (2013) assert that learners enjoy learning, enjoy democratization process taking place at classroom level, consider lecturers as students themselves and stop spending considerable time and money running around the libraries to look for information. From learner’s perspective, some challenges to blended learning were

identified the need to consider the learning styles and perceptual skills and abilities of students while designing the blended learning (Krishnan & Phalachandra, 2010).

Although using ICT in teaching and learning has its own advantages, many barriers were identified which inhibited teachers to integrate the multimedia and digital devices into teaching-learning. Bingimlas (2009) differentiates these barriers as teacher-level barriers and school level barriers. Teacher level barriers included lack of teacher confidence due to limited knowledge of ICT; lack of teacher competence due to the lack of knowledge and skills to use computers in the classroom; resistance to the change of old practices in pedagogy and negative attitudes of teachers who still do not believe in the benefits of technology. School level barriers include lack of time to prepare for the ICT based lessons; lack of effective training to the pre-service teachers and continuous professional development to the in-service teachers; lack of accessibility to these digital devices and lack of technical support.

Therefore, the in-depth analysis of the research perspective of Digital Literacy and ICT use in teaching-learning has helped the investigator to ascertain the immediate need for the present study. It was found that, although government has provided the schools with suitable infrastructure, no studies revealed that it is utilized completely for the right purpose. Also, no study tested the Digital Literacy level of present secondary school teachers of Mangaluru Taluk and their use of ICT in teaching-learning process. Study of past researches highlight the advantages of implementing ICT in the teaching. This probes a question - are our teachers sufficiently digitally literate to implement various technology based instructional methods in teaching-learning process for building strong digitally active citizens ready to face 21st century challenges? Also, do the secondary school teachers have the digital expertise to cater to various academic needs of the students? Thus, with strong conviction, the researcher feels that there is an immediate need for moving out of the comfort zone of traditional teaching and testing new constructivist technological approaches.

5. Objectives of the Study:

The following are the objectives of the present study:

- ✓ To study the level of Digital Literacy among secondary school teachers in Mangaluru Taluk.
- ✓ To study the extent to which ICT is used by secondary school teachers in teaching-learning process in Mangaluru Taluk.
- ✓ To compare the Digital Literacy level of teachers of Urban and Rural schools in Mangaluru Taluk.
- ✓ To compare the use of ICT by secondary school teachers of urban and rural Schools in teaching-learning process in Mangaluru Taluk.
- ✓ To study the relationship between Digital Literacy level and ICT use in teaching learning process of Secondary school teachers of Mangaluru Taluk.

6. Hypothesis of the Study:

- ✓ H1: There is no significant difference between the Digital Literacy level among teachers of secondary school of Urban and Rural schools in Mangaluru taluk.
- ✓ H2: There is no significant difference between the use of ICT among teachers of secondary school of Urban and Rural Schools in Mangaluru Taluk
- ✓ H3: There is significant relationship between Digital Literacy level and ICT use in teaching leaning process of Secondary school teachers of Mangaluru Taluk.

7. Methodology:

The present study was conducted as descriptive survey method, where a survey was undertaken to study the Digital Literacy Level and ICT use in teaching-learning among Secondary School in-service teachers teaching Karnataka State syllabus in Mangaluru Taluk. The investigator collected the data from 73 teachers of private, aided and government schools of both urban and rural areas across Mangaluru Taluk. Simple random sampling method was employed to select the samples for the study. The tools used for the study were two questionnaires namely, 'Digital Literacy Inventory' and 'ICT Use in Teaching-Learning'. Digital Literacy Inventory was constructed by the investigator to measure the level of Digital Literacy among Secondary School teachers of Mangaluru Taluk. The tool 'ICT Use in Teaching-Learning' was adapted from Bhalla (2013) which measures the use of digital devices by secondary school teachers in teaching-learning process. The study utilized statistical techniques namely - percentage and Normal Probability Curve. The significance level was set to 0.05 levels. t-test was employed to find the difference between the Digital literacy and ICT use in teaching-learning among Urban and Rural secondary school teachers. Pearson Product Moment Correlation "r" was calculated to find if there was any relationship between Digital literacy and ICT use in teaching-learning among secondary school teachers.

8. Major Findings:

- ✓ The Digital literacy level among Secondary School teachers in Mangaluru Taluk is average.
- ✓ The extent to which ICT is used by teachers in Secondary Schools is average.
- ✓ There is no significant difference between the Digital Literacy level among teachers of secondary school of Urban and Rural schools in Mangaluru taluk.

- ✓ There is no significant difference between the use of ICT among teachers of secondary school of Urban and Rural Schools in Mangaluru Taluk.
- ✓ There is significant positive relationship between Digital Literacy level and ICT use in teaching leaning process of Secondary school teachers of Mangaluru Taluk.

9. Educational Implications:

Based on the research findings, the researcher has put forth the following educational implications of the study:

- ✓ Since both the Digital Literacy level and ICT use of the secondary school teachers is average and no significant difference between Urban and Rural schools of Mangaluru Taluk, the department of secondary education can collectively put in place a mechanism to train/orient teachers into ICT. The training programs must convincingly highlight the benefits of integrating ICT into teaching-learning both for academic progress of students as well as the professional development of teachers.
- ✓ Training programmes must cover all in-service teachers in an elaborated manner such that all teachers who are digitally immigrant must get self sufficient in using ICT resources in their classrooms.
- ✓ Trainings must include specific areas of ICT use. Namely, regular classroom instruction, differentiated instruction, drill and practice of concepts, research and exploration of concepts to enhance higher order thinking skills, assessment of thinking and learning styles of students, introduction of self-directed learning, etc.
- ✓ Trainings for teachers also must focus on blending and enhancing social skills of teachers. This in turn will reflect on students when teachers focus on collaboration, communication and sharing of knowledge from one person to the other. Further, promoting international mindedness in the entire educated community of Mangaluru taluk
- ✓ Since most school teachers are loaded with both teaching and administrative works, a systematic curricular programme around ICT in every subject must be drawn defining benchmarks of achievement that helps monitor the implementation.
- ✓ Teachers who are already digitally literate must be given the liberty, flexibility and encouragement by the schools to try innovative ways of using the ICT in the schools for various educational purposes.
- ✓ Online courses as a part of distance education could be formulated for in-service teachers to enhance the digital literacy and improve their teacher competence. The teachers can undergo these courses at their own pace and time.

10. Conclusion:

Teachers play a major role in preparing today's children to confidently face tomorrow's digital world. The present study reveals that Digital Literacy of secondary schools teachers plays a major role in the teaching-learning process of secondary school students. Also, the use of ICT in the pedagogy currently is very limited. Thus, every teacher must take it as their personal responsibility to digitally upgrade themselves for the benefit of their digital native students. Every school must take it as their personal responsibility to cater to the specific needs of their teachers and students in this concern. Teachers are required to use ICT, not only for the content mastery like Mathematics, Science and language; but also integrate ICT into pedagogy for cultivating interdisciplinary ideas like global awareness, civic and health literacy, mastery of major skill areas like creativity and innovation, communication and collaboration, critical thinking, problem solving and decision making. Teachers must take the first step to materializing these ideas which will promise a better future for the present young Indians.

11. References:

1. Anboucarassy, B. (2010). Effectiveness of Multimedia in Teaching Biological Science to IX Standard Students. EDUTRACKS, 9(5), p. 37-38.
2. Andersen, N. (2002). New Media and New Media Literacy: The Horizon Has Become the Landscape—New Media Are Here. A report produced by Cable in the Classroom, pp. 30–35.
3. Bhalla, J. (2013). Computer Use by School Teachers in Teaching-learning Process. Journal of Education and Training Studies, 1(2), p 174-185. Retrieved from http://jets.redfame.com.
4. Bingimlas, K. A. (2009). Barriers to the Successful Integration of ICT in Teaching and Learning Environments: A Review of Literature. Eurasia Journal of Mathematics, Science and Technology Education, 5(3), p. 221-234.
5. Calvani, A., Cartelli, A., Fini, A., & Ranieri, M. (2008). Models and instruments for assessing digital competence at school. Journal of e-Learning and Knowledge Society, 4(3), p. 183-193.
6. Covello, S. (2010). A review of digital literacy assessment instruments. Syracuse University. Retrieved from http://www.academia.edu/7935447/A_Review_of_Digital_Literacy_Assessment_Instruments
7. Kaur, N. (2014). Effectiveness of Multimedia Approach in teaching of Arts at Secondary Stage. EDUTRACKS, 13(8), pp. 17-19.
8. Kumar, D. & Singh, A. (2013). Computer Technology as an Interactive Teaching System: A new Trend in Education. EDUTRACKS, 12(5), pp. 15- 18.

9. Krishnan, D. & Phalachandra, B. (2010). Effect of blended learning strategy on higher order thinking and learning science among secondary school students. (Doctoral Thesis, University of Mysore, Karnataka, India). Retrieved from http://ir.inflibnet.ac.in:8080/jspui/handle/10603/73173
10. Luehrmann, A. (1972). Should the computer teach the student or vice-versa? Spring Joint Computer Conference Proceedings, Vol. 40, AFIPS, Montvale, N.J.
11. Mehar, R. & Kumar, V. (2013). Effect of Audiovisual Aids on Achievement in Physics in relation to Creativity. EDUTRACKS, 12(12), pp. 32-35
12. Milton, M (2013). Digital literacy and digital pedagogies for teaching literacy: Pre-service teachers' experience on teaching rounds. Journal of Literacy and Technology, 14(1), p. 72-97.
13. Mirji, A. B & Gaddi, A. V. (2013). The Changing Role of Teachers in Changing Environment: A Multidimensional Approach. Dimension of Education, 3(2), p. 7-11
14. Nagarajan, R., Velmanirajan, K. & Kanna, K. S. (2013). Integrating Digital Technologies in Teaching Learning Process. i-manager's Journal of Educational Technology, 10(3), pp. 1-5.
15. Nimavathi, V. (2013). Effectiveness of Multimedia for the Development of Scientific Attitude. EDUTRACKS, 13(4), pp. 42-44.
16. Omoniyi, T & Quadri, A. T (2013). Perceived Competence of Nigerian Secondary Schools Teachers in the Use of Information and Communication Technology (ICT). Journal of Education and Practice, 4(10), p. 157-164. Retrieved from www.iiste.org
17. Patil, P. M (2011). Multimedia in education: An overview of Research Findings. Dimension of Education, 1(2), p. 17-19.
18. Reddy, G. L & Ramar, R. (1998). Effects of Video instruction on Achievement of Slow Learners in Mathematics. Media and Technology for Human Resource Development, 10(3&4), pp. 43-50.
19. Sangràa, A & González-Sanmamedb, M (2010). The role of information and communication technologies in improving teaching and learning processes in primary and secondary schools. Research in Learning Technology, 18(3), p. 207–220.
20. Singh, N. & Gurdel, P. K. (2013). Effect of technological Support Services on the attitude of secondary school students towards science subject. BRICS Journal of Educational Research, 3(1), p. 57-63.