

ROLE OF INFORMATION COMMUNICATION TECHNOLOGY IN ENHANCING SCIENTIFIC CREATIVITY: A REVIEW

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ABSTRACT

Creativity is a phenomenon which always works with analytical or divergent thinking with the originality of the ideas. Science is a stream that gives hands on experiences, which leads toward cognitive development, with analytical power. Scientific creativity is knack to administer the science experiments. To find out the smart solutions of given problems, ICT paves the way for didactical learning approaches. To endeavor the review of preceding work is to present a meaningful analysis of the related literature of research evidences and make it available and providing course of action to upcoming researchers, teachers and administrators. This review paper contributes for persuasive pointers of upgraded learning outcomes with ICT and differences in scientific creativity based on gender and school type. Some of the studies clearly depicted that creativity can be fostered by various methods and gender differences have been found in various studies. Information Communication Technology has turn out to be means anticipated for creating better learning atmosphere at any stage of learning. In school going students Information communication technology is an instant tool to provide acquisition of knowledge of any subject with maximum content as well as maximum output. At any level of learning ICT becomes chief producing component of learning ecosystem. With this review paper researcher wants to know that how the use of ICT effect the level of scientific creativity in school going students. It also describes the relationships between scientific creativity and ICT, and presents a review of numerous overtures (approach) that have been proposed over the past few years in the field of creative education.

KEYWORDS: *Science, Scientific Creativity, Information Communication Technology.*

Introduction

With the aim to make better learning atmosphere this review paper strives to tie up the science creativity and information Communication Technology less than one topic which can make a remarkable differences in the field of education. Education is the most important pillar of human development, it not only trains the students for their existence, but also prepares students to get along their lives for present and future. According to the literacy rate of India in 2011 is 74.0 per cent. Literacy rate among females is 65.5 per cent whereas the literacy rate among males is 82.1 per cent. In 2011, literacy rate of Madhya Pradesh is 70.6 per cent as compared to 63.7 per cent in the year 2001. During the last decade the rise in literacy rate of Madhya Pradesh is 6.9 percentage points Status of Literacy, i.e. still teachers and students have to work very hard to uplift the education in this state. While upgrading the education science and creativity become very important aspect of the up gradation. Science as a subject gives wings to the students to fly high with their pace and interest. Creativity is the phenomenon which leads the students to think and act divergently.

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(Zeidan & Jayosi, 2015), conducted a study on Science process skills and attitudes toward Science and found that, positive correlation between science process skill and attitude toward science, gender differences has also been found in this study females are more knowledgeable in comparison to their counterpart. Researcher believes that positive attitude for science make the students more interested in focusing on science (Yadav & Mishra, 2013), stated that modern methods of teaching science have higher achievement level than traditional methods. According to (Swamy, 2013), achievement in science had significant relationship with all the components of class room environment and all the tasks of the scientific creativity positively correlated with the Achievement in science. (Daud, Omar, Turiman, & Osman, 2012), also put emphasis on changing of learning styles, project based learning can create interest in science.

According to (Hadzigeorgiou, Fokialis, & Kabouropoulou, 2012), Creative act like self actualization and self expression had played catalytic role in the grooming of the students. This can open new vistas for both teachers and learners. (Filosa, 2008), reported that technology effect the performance level of the science students. According to the UNESCO report based on science teaching and learning the issues of availability, accessibility, acceptability and adaptability are essential. Without these, there can be no quality education specially science education in the long-term – to be able to participate in the variety of human activities and meet the challenges to society emphasize the importance of education through science Qian Tang. In this careful examination and analysis of science is needed than is envisaged by the conventional study of science (Kocabas). To make teaching and learning process more interesting teachers have to change the strategies of teaching, perhaps an understanding of the driving force of play behind education would be a good, practical start. Role play is available now, and can be used as an additional teaching method in the science laboratory. If done correctly, role-play is extremely enjoyable (McSharry & Jones, 2000).

To cultivate the creative ideas among the students, as a resourceful teachers we have to set some parameters to congregate the multifaceted provocations to meet the need of the society. (Sayadian & Lashkarian, 2015), also found that creativity involves a shift from Concrete thinking to abstract thinking. (Sharma), conducted a study on pre-adolescent's scientific creativity relationship with scholastic' achievements of students and found that scientific creativity can be developed with the help of many activities like science fair, science Olympiad, science congress etc school level to national level. (Bolandifar & Noordin, 2013), found positive relationship between creativity and academic achievement. Thus, Creativity is basic requirement for higher achievement, that means to uplift the academic achievement and creativity should be strengthened. The composite culture demands for skilled, talented and scientific temperamental personality to resolve the various issues related to science and creativity. (Candrasekaran, 2013) stated that the relationship between creativity and achievement is complex. Neuroscience of creativity reveals that circuits in the prefrontal cortex perform the computation that transforms the novelty into creative behavior (Dietrich, 2004). Creativity is notoriously difficult to define and assess. Above study clearly state that if we want to improve student achievement we should nurture the creativity in the early age. Creativity is an all about the originality of ideas it is very important process for the progress and major advances are made in every field. The entire advanced are made as result of new ideas or creative process. it is a basis of all social development and new inventions and discoveries in the field of science and technology it is very important concept needs greater attention. Because without creativity people cannot invent or discover or create advancement in the field of education above study concern with its originality, usefulness, socially accepted, it includes new combination of old components. Creativity always leads to the talents and it has always new and novel approach. Need of the hour is freely creative and original thinker (Shaheen, 2010) also contended that recent upsurge in the field of creativity and education has taken dominant place in curriculum frame work as high order thinking skill development. It is our prime responsibility as an executive is to create the condition that allows the creativity to flourish- weather in any subject. Educational philosophy also puts emphasis on student's enhancement of creativity and self actualization.

Hans Raj and Saxena Rani Deepa (2016) Innovative methods of teaching are necessary for the development of scientific creativity. (Aldous, 2007) characterizing the successful novel problem solver, framework predicts that such individuals attend to feeling in listening to the self. As such they are likely to take the paths that operate through the Intuitive function. (Naderi, Abdullah, Aizan, Sharir, & Kumar, 2010) study provides empirical support for the relationship between aspects of creativity and academic

achievement and the finding that this relationship appears to have differences, depending on whether it is between males or females.

Paradigm shifts give the learners a completely new role that was not earlier described in the transmission model of teaching. Technology and teacher professional development in its use are best introduced in the context of broader educational reform which embraces a shift away from teacher-centered, lecture oriented towards learner centered, interactive and constructive learning environment(Majumdar, 2015). Learning is integrating science learning with ICT. In this regard, science teachers must master the skills to teach the 21st century by using ICT, such as web-based learning skills, including blogs, multimedia and interactive media.

Through this technology, teachers can produce scientific questions on the topic of study articles. As an alternative to improve the quality of teaching, teachers can ask questions that encourage students think through these virtual activities.(Daud et al., 2012) Students are given the opportunity to argue, comment, answer questions, and make inquiries through a virtual forum that failed to live by the teachers through blogs, websites and so on. This virtual activity is actually capable of creating a positive mind in order to use their brain knowledge.

Top concern of any civilized society is education. The socio economic condition of students has play significant role in their academics. The use of information and communication technology (ICT) has the room to grab the opportunities for learning effectively. Swami (2013) also found that ICT has conceptualized mostly monolithic and homogenous entity, and it has become an essential component of life. It has advent and pervaded almost every part of human life. It will conquer the new shatabdi of educational field. So that learners can access knowledge any time anywhere. A positive findings was about all those teachers who were not well versed with the computer and other technology, expressed keen interest in undergoing training for the same. They felt that if trained, they would be in a position to make use of resources available in the school (Meenakshi, 2013).

Further some research studies clearly depict that Information and communication technology is just like a back bone of modern society. proposed patterns of IT in education as center on nature of knowledge, functional techniques and a controlling criterion in society(Hamidi, Meshkat, Rezaee, & Jafari, 2011). It has a very basic role to play, in the changing and modernizing education system of our country. Information communication technology can hold up the learning objectives, based on the demand of modern informative society. Information and communication technology (ICT), is becoming a buzzword because it has unlimited opportunities in real world. We are living in hi tech world every one start preparing their kids for facing the challenges on different levels. This preparation begins in the cradle every parents wish to see their wards on pinnacle. ICT plays vital role because it emphasized on development of new strategies and techniques for an effective and result oriented learning. promote students intellectual qualities through higher order of thinking, problem solving, improved communication skills and deep understanding of the learning tools and concept to be taught(Abdullahi, 2014). Thus it is a constant process of research which can benefit all the future teachers and learners of the society. ICT provide proper communication of content or information to the learners that can reflect on all three levels of memory. Up to some extent information communication technology can fulfill the deficiency of effective teachers. By the use of this technology students can learn according to their own ability and needs it can control the problem of individual differences to a great extent creative ICT based learning environments should entail platforms supporting problem- or project related information and make it accessible to others in order to trigger exchange(Brooks, Borum, & Rosenørn, 2014). Comprehensive analysis of the subject matter is also possible with the help of this technology it can make the presentation easy and logical. With the use of cybernetics and system analysis we can communicate and control the learners.(Bartsch & Cobern, 2003) to alleviate this problem, students saw each type of presentation in several lectures randomly throughout the semester. Furthermore, multiple exposures may decrease some biases that the students have. PowerPoint presentations might only be liked because they were new. With multiple exposures this potential confound was reduced.

Because it is related to the elements of a system which works together to produce most effective integrated system, In order to improve the quality and standard of education system Liberalization, Privatization, and Globalization is introduced. It will increase and improve the quality as well as quantity of education. Education can no longer be confined to what is in the text books; internet has removed all barriers to learning and made available sources of knowledge not accessible so far NPE2016.

To vanish the barriers of information communication technology (Bingimlas, 2009), has put emphasis on barriers to the successful integration of information communication technology in teaching learning environment. The major barriers are lack of confidence, competence and accessibility has been found to be the critical component of technology integration. As the researcher found that training modules in the study contained all the five multimedia components they are text, graphics, audio-video, and animation. The multimedia modules were developed complete with its forced relationships, 5w's (What, When, Who Where, why) and H (How), lateral thinking and PO and metaphorical thinking. (Gambari, Yusuf, & Balogun, 2015) results revealed that the students taught with PPT performed better than their counterparts taught with CB. Also, high achievers performed better than medium and low achievers respectfully. The PPT was found also to be gender friendly.

(El Asli, Berrado, Sendide, & Darhmaoui, 2012) using ICT had a positive impact in enhancing student's learning and their performance in the biology and geology course. (Wheeler, Waite, & Bromfield, 2002) ICT can be used to increase creative cognition and creative action in primary school education.

There is also a need to develop and use appropriate e-content to enhance the comprehension levels of children in various subjects. A strong mechanism for monitoring and management needs to be set in Revised ICT @ Schools Scheme.

Interactive multimedia material can also be hosted on the LAN at a much lower cost than on the Internet. This also has the added advantage of enabling students to access Program at their convenience, instead of having to adhere to a scheduled telecast. Essay II ICT in School Education (Primary and Secondary) 2010.

Conclusion

Everyone must have the sense of responsibility to uphold the challenges of 21st century. Which counterclaim (demand) the highly creative genesis to compete the world brilliantly. In this way science education pave the way for creativity. Student centric education is the prime need of the hour. In present scenario teachers work as facilitators they have to facilitate the students to think and learn. Learners can learn innovatively at their own pace and develop their own knowledge, in this way students have the opportunity to ask, argue, analyze, comment, and clear their inquisitiveness for long life learning. However, the biggest hurdle lies in teacher's willingness to adapt the change or to become active part of the change in the line of national progressive need. The trend of ICT in education is emerging in Indian society on faster rate. Educators, administrators, policy makers, students, researchers everyone has put more and more emphasis on collaboration of information communication technology in education at every level. Learners should know the basics of creativity then only productive result may come. It is a branch of knowledge to be driven by lifelong acquaintance. Creative teaching strategies originate novel approaches analyzing areas with divergent thinking. Hence, it is very important to nurture the creative talent at any age to ensure quality human capital. In addition, students can excel the new ideas with existing talent to make something better. In this way ICT is very resourceful for the learners and teachers. It is bonafide substantial to emphasize on teachers willingness, and pedagogical skills. ICT always encourages educational alteration for the benefits of the learners and always ready to exchange ideas, e-content for the betterment of quality teaching and learning processes. This enhances the standards of education. Therefore, policy makers and educationist must pay attention toward the implementation of ICT at school level.

ICT and scientific creativity together works for better tomorrow. Education is compulsory to obtain accumulate, endure, and analyze the situation. It invites all the stakeholders to play emphatic role in teaching learning process. It is essential for the researcher to generate appropriate structure of knowledge and to show that his/her research study is worth to the present society at any level. Learning of ICT becomes chief producing component of learning ecosystem. However, ICT set a bench mark for teaching and learning process. Most of the times majority of the strategies and techniques are relevant, or concise to the learning task and focused for better result. This will ameliorate the learning accuracy and training speed as well as lead towards the process of the development of original conceptual thoughts. Thus, the use of ICT can be a milestone in prediction and evaluation of student's learning. Thus, we can make a head full of knowledge, a heart full of emotion with open ears to listen content and hand to perform the activity.

Discussion and Suggestion

Scientific creativity is urging for better credentials. This is not recognized by most education system. For the sake of academic achievement, scientific creativity should be strengthened. It is the right time to make some basic changes in our curriculum. Which is the base line of our education system, all stakeholders should pay attention to do the modification in present curriculum. To think, analyze, understand to refine the subjects. With the help of faculty development program teachers should get proper trainings to nurture creativity in their respective classes. This gives positive reinforcement to learners as well as facilitators. ICT equip the students to carry out the given task effortlessly, swiftly, devotedly, for the sake of improved quality results. Some time situation becomes difficult because they get stuck due to the inadequacy of expertise in using modern technologies. At this time it becomes an obstacle. The need of the hour is to develop digital literacy as mandatory for all teachers. Then only these technologies can help us to overcome the obstacle and perform tremendously.

Educational Implications

- By creating positive attitude for science among the students.
- By arousing the natural instinct of keen observation, and inquiry approach among the students.
- By generating quest for excellence in science.
- By constructing their own knowledge with the help of previous knowledge.
- By clearing their concepts, creating their views, producing novel ideas etc.

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