



PEDAGOGICAL PROCESS AND CONTENT INTEGRATED TECHNOLOGY IN SCIENCE AT PRIMARY LEVEL

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ABSTRACT

Technology-based teaching as a tool can change the teaching–learning environment of the school. Dudeney (2010) emphasized that national ICT policies can serve many crucial policy problem related to teaching–learning. They provide a vision of how education systems run if ICT is integrated into teaching and learning process, and are beneficial to students, teachers, parents and the general population of the country. Infrastructure and facility of ICT is needed for the schools. In use of ICT sufficient computer labs and ICT equipment are required. This is to ensure that subject teachers have easy access to ICT tools whenever needed (Hennessy, S., Wishart, J., Whitelock, D., et al., 2007). Lack of adequate ICT equipment and internet access is one of the key problems that schools specifically in rural areas are facing now. In schools with computers, the student-computer ratio is high. The schools with ICT infrastructure are supported by parents' initiative or community power (Chapelle, 2011). ICT can be used as one of the most powerful multi-media aid in transacting the contents, effectively. UNESCO has suggested a model of integrating ICT in the teaching learning which is popularly known as the TPACK Model. Therefore, there is a need to implement this model for the classroom transaction of the content, irrespective of the levels of education.

Keywords: Pedagogical process, content integrated technology, Science teaching-learning and primary level.

Introduction

In a country like India, out of 28 states and 8 union territories, we have 1.5 million schools, 8.5 million teachers, 48 school boards and 26 crores children in school. Out of 15 lakh schools, we have 85 lakh teachers. The goal of teachers is to bridge the digital gap and impart quality education. The envisions of digital India campaign 2015, emphasizes on the Digital infrastructure, as a core utility of every citizen Digital India Mission of our present prime minister comprises of 9 pillars, one of which is digital education. In this context, the use of ICT in education occupies a pivotal position in the teaching learning. Research conducted in India and abroad proves the effectiveness of integrating ICT in the teaching learning process.

Twenty-first century is known as the “Century of Technology”. Technology has conquered the world over, including the field of education. The futurologist Alvin Toffler viewed that the society of this century is ‘Super Industrial Society’. Therefore, technology has become the knowledge transfer highway in most countries. Technology integration, nowadays, has gone through innovations and transformed our societies that has totally changed the way people think, work and live (Grabe, 2007). So, schools and other educational institutions which

are supposed to prepare students to live in “a knowledge society” need to consider ICT integration in their curriculum (Ghavifekr, Afshari & Amla Salleh, 2012).

Integration of Information, Communication, and Technology (ICT) in education refers to the use of computer-based communication that incorporates into the daily classroom teaching-learning processes. While preparing the students for the current digital era, teachers and teacher educators are seen as the key players in using ICT in their daily classrooms. This is due to the capability of ICT in providing dynamic and proactive teaching-learning environment (Arnseth & Hatlevik, 2010). The aim of ICT integration is to improve and increase the quality, accessibility and cost-efficiency of the delivery of instruction to students and at the same time providing benefit from networking the learning communities to face the challenges of current globalization (Albirini, 2006, p.6). The Process of adoption of ICT is not a single step, rather it is a continuous step that fully support teaching - learning and information resources (Young, 2003). integration of ICT in education, is technology-based teaching and learning process that relates to the learning technologies. The use of technology in education contributes in the pedagogical aspects that to effective learning with the help of ICT elements and components (Jamieson-Procter et al., 2013). Subjects like mathematics, science, languages, arts, humanistic etc can be learned more effectively through technology-based tools and equipment. ICT provides complementary support for both teachers and students effective learning with the help of the computers (Jorge et al., 2003). Computers and technology a replacing tool but act as add-on supplements needed to better enhance the teaching and learning. The need for ICT integration in education is crucial, because with the help of technology, teaching and learning is not only happening in the school environment; teachers and students are physically in distance line example of pandemic 2019. However, ICT integration is not a one-step learning process, but it is a continual process of learning that provides proactive teaching-learning environment (Young, 2003).

ICT helps both the teachers and students to disseminate the knowledge of subject area with the help of technology- based teaching and learning. Innovation offers various ways educational videos, stimulation, storage of data, the usage of databases, mind-mapping, guided discovery, brainstorming, music, World Wide Web (www) that makes the process of learning more fulfilling and meaningful (Finger & Trinidad, 2002). On the other hand, students will be benefitted as they are not bounded to the limited curriculum and resources. Teachers can design their lesson plans in an effective, creative and interesting way that would result in students’ active learning in and make teaching-learning joyful. The researches proved that use of ICT in teaching will enhance the learning process and maximize the students’ abilities in active learning (Finger & Trinidad, 2002; Jorge et al., 2003; Young, 2003; Jamieson-Procter et al., 2013).

Hermans, Tondeur, Van-Braak, and Valcke (2008) have identified three main stages for ICT to be highly valued and regarded by the teachers; integration, enhancement and complementary. Integration approach is about implementing right use of ICT in particular subject area that involved complex concepts and skills to improve student’s achievement and attainment. Besides, the review of curriculum is also needed so that only related ICT resources and appropriate software will be installed for the main aims and objectives of curriculum to be achieved. Enhancement approach is about using ICT to give great emphasis on the topic introduced. For instance, Microsoft PowerPoint can be used to present the topic in a very innovative and creative way that will lead into discussion and exchanging ideas and thoughts. Finally, complementary approach is when the ICT is used to aid and support the student’s learning. This approach allow students to be more organized and efficient in which they can take obtain the notes from computer, submit their works by email from home as long as they meet the deadline and looking for information from various sources provided online to fulfil the task given to them (Hermans et al., 2008)

Needs of Justification

Concepts are building blocks of knowledge certain abstracts and concrete concepts in science at primary level will be made easy by either activity/projects/module method. If experiments are provided by the students in simulated conditions learning becomes meaningful. NCF 2005 have insisted on infusion of technology in teaching learning process at all levels of school education. In the post global era this facilitates the effectiveness in the class room teaching. Students of the millennium work better through technology and quite often find the content and direct teaching quite state. Teachers feel handicap when properly developed material/modules in specific area are not available following the pedagogical principals. Therefore, it is necessary to develop material for indicating & imparting training to the teachers using these modules.

Specific Objectives

1. To analyse the contents of science at primary level.
2. To select the concepts of science at primary level.
3. To develop scripts for the content material.
4. To develop material integrating content and pedagogy with technology.

Methodology

The script writing in science is based on the assumption that science content taught at the primary stage should not be governed by a disciplinary approach. Students should be allowed to explore their surroundings and develop their own ideas and understanding. They need to develop the confidence to experiment, collect data, organize and analyze it.

They need to learn to draw inferences, test and generalize from their analysis. For science to make sense to them and to use their life experience, we need to give them opportunity to relate the two. Many students know a lot about different foods, plants, insects, birds and other animals etc. All this can be used for effective non-rote learning. There would be plenty of such opportunities for Science teachers at primary level. These opportunities, however, may be different for different teachers.

Teacher is an important component of learning process. A good script help teacher to transact lessons effectively and efficiently. The teacher is also expected to realize certain expectations set forth in National Curriculum Framework–2005. It lays down the following guiding principles:

- Connecting knowledge to life outside the school.
- Ensuring that learning is shifted away from rote methods.
- Enriching the curriculum to provide overall development of children rather than remain textbook-centric.
- Making examinations more flexible and integrated into classroom life.
- Nurturing an over-riding identity informed by caring concerns within the democratic polity of the country.

Preparation of scripts using ICT

SCRIPT FOR E – CONTENT

EXAMPLER

CLASS	- III
SUBJECT	- EVS
UNIT	- Chapter 5
TOPIC	- Chhotu's House

Objective

1. Students will be able to differentiate between a house and a home
2. Students be able to understand the different parts of a house and its use.
3. Students will be able to know which part of the house is used by which member of the family and how much time they spend.
4. Students will understand the importance of hygiene to be maintained in and around their house Students will understand the importance of washing hands and to keep themselves clean.
5. Students will be able to know how to decorate the house during various occasions and festivals.

Content Highlights

The topic is important as it develops sensitivity of a child towards his home, the importance of a house, family members their traditions, their approach towards the family members. They will be able to understand the difference between a house and a home. The students will learn the good practices followed in the home like the disposal of garbage, the use of toilets , when and how to wash your hands, keep yourself clean by brushing, bathing, clipping your nails etc., and the consequences if you don't keep yourself clean. Aesthetic sense of art / decoration

of their own home will also be developed by using either the materials available at home or purchased from a local market.

Procedure Details

The teacher will start with a video wherein different types of houses are shown and then the topic will be introduced. The students will be able to differentiate between house and home they will be shown the various parts of houses, they will know the importance of washing hands, cleanliness, good and bad practices to be followed. The students will try to know the consequences of not keeping themselves clean.

Learning Outcomes/Conclusion

1. Identifies various types of houses , parts of house and their use,
2. Differentiate between a house and home
3. Respects the role of family members living together.
4. Realizes the importance of hygiene and cleanliness in and around the house.
5. Understands how to dispose the garbage and the use of toilet

Assessment

1. The students will be asked to draw a picture of the house with its different part and name the family members who stay together.
2. Write at least two points which differentiate a house and home
3. List out the uninvited animals present in their home like spider...
4. List at least two good practices that you do everyday
5. On different occasion how do you decorate your home differently using the available material either at home (best out of waste) or at the local market.

Properties

Story Board For E-Content

Scene No.	Activity (Introduction, Presentation, Demonstration, Discussion etc)	Dialogue/Audio (What we would like to say)	Visual			Remark
			Presenter/ Image/ Video	Text/ Slide	Ani.	
1	Introduction	After watching the video of different types of houses, the teacher will ask how many types of houses you have seen (testing pre knowledge), which type of house you live in?	Video Presenter			
2		Now let me tell you a story, a story of a boy, his name is chhotu. He had come from a village to a big city like Mumbai, He saw a pipe and started living there. he divided his house (pipe) into various parts. Have you seen people living in a pipe?	Video of various parts of houses			

		Chhotu, then				
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		invited his friend Monu to live with him in the pipe. Now tell me how many members live with you in your family?	Presenter			
4		How many parts are there in your house and in which family member spends the maximum time in which part of the house and which family member spends the minimum time in which part of the house. Students tell me the difference between a house and a home?	Image (attachment 1)			
5		Other than family members who all live with you? Do you have any pet animal?	Image of lizard (attachment 2)			
6		Have you observed this animal in your home? Yes Name some	Image of rat, spider, fly, cockroach (attachment 3)			

		other animals you have seen? So along with our family members we have some uninvited animals also who live with us. Students if you have a pet	Image of how to maintain hygiene (attachment 4)			
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	<p>animal at your home how do you maintain hygiene and cleanliness ?</p> <p>We should be careful while using toilets and disposing off the garbage</p> <p>What have you observed? You can see we have to either flush or pour water with a help of mug after using the toilet and don't forget to wash your hands after using the toilets. We should always wash our hand properly</p> <p>To maintain our hygiene and</p>	<p>Image of toilet (attachment 5)</p> <p>Image of washing hands (attachment 6)</p> <p>Image of hygiene</p>			
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	<p>keep ourselves clean can you tell me what we should do?</p> <p>We have so far learned that there are various types of houses, we have various parts in our houses , we have some uninvited animals also, and how to keep our home and its surroundings clean and maintain hygiene. To make our home look good we decorate our home also Students can you</p>	<p>(attachment 7)</p> <p>Image of decorated home (attachment 8)</p>			
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		<p>tell me when do you decorate your home?</p> <p>You can see the house has can be decorated with the help of flowers colour papers etc., So you can decorate your home on various festivals. So students respect your family members,</p>						
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keep yourself , your home and surroundings clean and do not forget to wash your hands regularly

Attachment 1

HOUSE
a building where people live



HOME
the place you love



Attachment 2



Attachment 3



Attachment 4



Attachment 5



Attachment 6



Attachment 7

PERSONAL HYGIENE FOR KIDS



Oral Hygiene



Bathing Ritual



Hand Washing



Grooming Nails



Toileting Hygiene



Foot Care



Clothes hygiene

Attachment 8



Discussion

The child at this stage should be engaged in learning principles of science through familiar experiences, working with hands to design simple technological units and modules to learn more on environment and health through activities and surveys.

Scientific concepts are to be arrived at mainly from activities and experiments. Group activity, discussions with peers and teachers, surveys, meaningful organization of data and their display for information, knowledge or message through exhibitions, etc., in schools and neighborhood are to be an important component of pedagogy. The teacher at this stage should, therefore, promote learning of scientific concepts through familiar experiences, environmental awareness and environmental concerns, activities affecting life, experimentation, assembling and designing by hand, use of simple tools and working models, concerns of health, day-to-day scientific phenomena, interactive and practicing concern of resources and group activities, discussion with teachers and peers.

NCF–2005 observes that good science education is true to science, true to child and true to life. The teacher should, therefore, ensure that:

- i. The content, process, language and pedagogical practices are age-appropriate and within the cognitive reach of the child.
- ii. It must attempt to convey correct scientific content. Simplification of content must not convey something erroneous or meaningless.
- iii. The learners engage in acquiring the methods and processes that lead to generation and validation of scientific knowledge and helps the student in ‘learning to learn’ science and construct knowledge.
- iv. Science is placed in the wider context of the learner’s environment, local and global, enabling them to appreciate the issues in science, technology and society and preparing them with the requisite knowledge and skills to enter the world of work.
- v. The teacher promotes the values of honesty, objectivity, co-operation, freedom from fear and prejudice and develops in the learner a concern for life and preservation of environment.
- vi. It is also informed by a historical perspective, enabling the learner to appreciate how the concepts of science evolved with time and to understand how social factors influence the development of science. Learner should also be able to take pride in their national contribution and wisdom in various areas of learning.

Conclusions

Common Scientific Processes include observation, identification, classification, discovering relationships, performing measurements, experimentation, establishing

cause–effect relationships, interpretation of results, inference, prediction and making hypothesis and testing the same. The teacher must promote process association with science teaching appropriate to the stage. Teaching-learning process should be joyful not rote, stressing and burdensome. It should be related with life outside the school and beyond textbooks. It should also relate to the various scientific, environmental, technological, social and ethical values, scientific temper and human qualities enshrined in the Constitution of India.

Flexibility and adaptability are the important basic skills to be developed. Attributes of learning to learn and to be able to construct the knowledge are very important across every area of science and technology. A script should possess enough information about available resources like science projects, museums, kits, charts, audio, video and computer-assisted learning materials. Field trips to such projects and other centers of learning science may also be included in the process.

Information and Communication Technology (ICT) ICT and internet sites must be exploited thoroughly to be informed and knowledgeable about the various issues and even to promote debate in the field and approaches towards them. Related internet websites may be searched and integrated with transactional methodology and also referred to, in the script material.

REFERENCES

- Albirini, A. (2006). Teachers’ attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education*, 47(4), 373-398.
- Arnseth, H.C., & Hatlevik, O.E. (2010). Challenges in aligning pedagogical practices and pupils’ competencies with the Information Society’s demands: The case of Norway. In S. Mukerji & P. Triphati (Eds.), *Cases on technological adaptability and transnational learning: Issues and challenges*. Hershey: IGI global.

- Ghavifekr, S., Afshari, M., & Amla Salleh. (2012). Management strategies for E-Learning system as the core component of systemic change: A qualitative analysis. *Life Science Journal*, 9(3), 2190-2196.
- Finger, G., & Trinidad, S. (2002). ICTs for learning: An overview of systemic initiatives in the Australian states and territories. *Australian Educational Computing*, 17(2), 3-14.
- Grabe, M., & Grabe, C. (2007). *Integrating technology for meaningful learning* (5th ed.). Boston, MA: Houghton Mifflin.
- Hermans, R., Tondeur, J. , Van -Braak, J., & Valcke, M. (2008). The impact of primary school teachers' educational beliefs on the classroom use of computers. *Computers & Education*, 51(4), 1499-1509.
- Dudeney, G. (2010). *The Internet and the language classroom* (Vol.X). Cambridge: Cambridge University Press.
- Chapelle, C. (2011). *Computer applications in second language acquisition: Foundations for teaching, testing and research*. Cambridge: Cambridge University Press.
- Young, S. C. (2003). Integrating ICT into second language education in a vocational high school. *Journal of Computers Assisted Learning*, 19, 447-461.

