

REFLECTIONS OF THE PRE-SERVICE TEACHERS ON ICT AIDED CONSTRUCTIVIST LEARNING APPROACH

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Abstract

This study explores the reflections of the Pre-Service Teachers on Information and Communication Aided Constructivist Learning Approach in Science. 35 pre-service teachers participated in the orientation program and provided their reflections. The Pre-Service Teachers were interviewed and their reflections were taken orally and video recorded and in written form also. Valuable constructs about the work they developed through the Orientation Program and Internship experiences were also considered. Both the forms of reflections and narratives were qualitatively analyzed. It was possible to gain useful insights into ways in which they transitioned from Traditional Teaching Practices to ICT aided Constructivist Learning Practices. The Reflections reveal that the ICTACLA facilitated the Development of Knowledge & Skills of Teaching and Learning of the Pupil- Teachers in Innovative Ways.

Introduction:

Information and Communication Technology (ICT) has revolutionized our society. Effective integration ICT into teaching and learning is becoming an essential competency for teachers. ICT has the potential to transform the nature of education - the role of teacher, student, learning processes and the curriculum. Education systems around the world are under pressure to use the digital technology to teach students the knowledge and skills they need in the 21st century. The use of ICT in teacher education programs is gaining momentum throughout the world. With the rapid evolution of emerging technologies, the integration ICT has sought the attention of teachers increasingly. A simple combination of hardware and software will not make integration naturally follow (Earle, 2002). Teachers need to plan thoughtfully before they start ICT integration into their curriculum. For instance, they have to choose the correct ICT tools for contextual learning objectives, modify existing resources to develop new learning environments for engaging specific groups of learners, and decide scaffolding strategies for student-centered learning. The UNESCO, 1998 World Education Report- Teacher and Teaching in the Changing World describes the radical implications of the ICT has for conventional teaching learning. With the emerging digital technologies the teaching profession is evolving from teacher-centered to learner-centered learning environment. In order to take the full advantage of digital technology in teaching learning, it is essential that pre-service and in-service teachers should effectively use these new tools of learning. Teacher education institutions and programs must guide the pre-service and in-service teachers in this direction.

Constructivism has roots in Philosophy, Education and Psychology. Constructivism criticizes objectivism which embraces the belief that a human can come to know external reality, but constructivism holds the opposite view, that, the only reality we can know is that which is represented by human thought. According to constructivism, learners are active participants in knowledge construction by selecting, observing, manipulating, experimenting and constructing meaningfully. Learning is an internal process influenced by the learner's personality, prior knowledge and learning goals (Davidson, 1995). The basic belief of constructivism is that knowledge is actively constructed by learners rather than transmitted by the teacher; learners are active knowledge constructors rather than passive information receivers (Jonassen, 1991).

A constructivist Perspectives on Teaching Learning provide the idea that the basic tenet of all aspects of constructivism is that the knowledge is constructed and transmitted, 'Human knowledge -whether it be the bodies of public knowledge known as the various disciplines, or the cognitive structures of individual knower's - is constructed' (Phillips, 1995). One of the aspects of constructivism according to George Kelly (1995) is that 'Every man is Scientist; every person constructed the world by differently testing out their constructions against experience'. Science is the building of a picture of the world. It is an intellectual enterprise aimed at understanding the world. (Harre, 1986). So, the constructivism in science is germination, incubation, creation, construction & innovation.

Information and Communication Technology Aided Constructivist Learning Approach (ICTACLA) is Creating the Constructivist Learning Environment using the Applications of ICT, providing the situations to learners to engage them in the classroom in constructivist learning environment. In Constructivist classes ICT facilitates in making the learners to interact between Pedagogy, Technology and People. Naturally, pedagogy and social interaction are the central focus of a learning environment, and technology provides essential support. It also encourages better student learning through the learning objectives of project based learning or learning by doing and to enable problem solving, analysis, creativity and communication to take place in the classroom. (Bates, 2000). ICT has been found to affect the student's motivation (Guthrie et.al.,2004). If the school teachers are expected to bring about a revolution in their approach to teaching, then the same revolution must precede in the Colleges of Education. So in the present study the importance of teacher's preparation and support for the successful implementation of constructivist approach using ICT as tools for the teaching is emphasized. There is a need to equip teachers with competencies to use ICT for their own professional development (National Curriculum Framework, 2009). ICT stands for the seamless incorporation of technology to support and enhance student engagement in meaningful learning and for attainment of curriculum objectives. ICT will increase the role of the teacher in the classroom. ICT on its own can never evoke learning. So the role of the teacher is a must. ICT should be integrated with certain learning theories.

Objectives

To study the effectiveness of the ICT Aided Constructivist Approach of Teaching Science through the Pre-Service Teachers' Reflections.

Methodology

Method & Design

It is an Experimental Study employing Single Group Pre-Experimental Design.

Sample

The sample included the entire cluster of 35 Pre-service Teachers of University College of Education, Dharwad, Karnataka.

Tools

A semi-structured interview schedule was constructed by the investigator. It was administered on the selected Pre-service Teachers in written form to elicit their reflections. They were asked to write & speak their reflections.

Delimitations

The study is delimited to Pre-Service Teachers of Secondary level of Science Steam.

Analysis & Interpretation

The reflections collected were content analyzed.

Reflections of the Pre-Service Teachers on ICTACLA in Science

a. Feel of ICTACLA

Pre-service teachers opined that this approach has really helped in Science. It trains all students in such a way that they come to class with constructive ideas. It helps the students to think about a concept in different ways. Small ideas help to build bigger concepts easily. Prior knowledge helps to build further knowledge meaningfully. It makes the learning environment more learner friendly. As it is based on the principle of learning by doing, it makes the learners very active. Teachers prepare various interesting strategies for as per the interest of the students. The assessment is an opportunity to the students. As teachers need to practice more, it brings the confidence among both teachers and learners.

b. ICTACLA facilitating Science

Pre-service teachers felt that ICTACLA helps in Science. They can explore their own ideas and views and also imagination of the students is brought in front of their eyes in the form of power point presentations, specimens, and virtual classes, field trips which can erase the wrong imagination or idea and make students understand subjects like science much better. In science there are lots of experiments to do, the environment could be provided by ICT facilities and makes the learners to engage in the discussion. The abstract concepts, like, structure of atoms, chemical bonds, animal and plant physiology and many more concepts could be made clearer through animations. This approach gives a concrete picture for our imagination of the concepts of science. It helps to develop science process skills. Through lecture method science can only be instructed but the scientific ideas cannot be constructed. This approach is a composite approach; a mix of various approaches.

c. Lesson Designing employing ICTACLA for Practice Teaching

It made the Pre-service Teachers to work a lot before going to the actual field. ICTACLA motivated the Pre-Service Teachers to formulate exploration based lesson designs. Learning by doing principle always kept them active. Innovative Lesson Designing by use of ICTACLA was really joyful and creative. In designing the lesson plans, there was a lot of freedom to use various strategies for teaching-learning. Designing Lesson Plans was difficult but at the same time creative and joyful. Feedback by the investigator on the Lesson Plans designed by the Pre-Service Teachers employing constructivist approach really made them excel in innovative lesson designing for Science Teaching.

d. Experiences during Practice Teaching employing ICTACLA in the Schools

Pre-service teachers opined that by adopting such strategy in the classroom, students were made very active and teachers could make the concept very clear. Through this approach the teaching-learning was very interactive, students learnt with a lot of interest and curiosity. Because of doing experiments in the classroom and demonstrations through virtual media via animations and videos students could be fully immersed. Activity based Evaluation by the Student-Teachers was really exhilarating. Through Internet the biographies of the Scientists could be accessed. The Pre-Service Teachers could teach even more than the syllabus demanded. Initially it was a challenging task but as pre-service teachers had practiced well in the college of education, theoretically, they were confident, but, due to non availability of facilities in some places could not use ICT. Even then they experienced the constructivist approach very well. In teaching some concepts of science which were very abstract in nature could be introduced relatively easily. Students also learnt with a lot of interest and enthusiasm. New ideas were generated by the students. It developed their enquiring skills & analytical thinking.

e. Exploring the Possible Role of Pre-Service Teachers in the context of ICTACLA in their Profession

Pre-service teachers opined that from the day they know ICTACLA, they value it. To bring the quality in education one should adopt various teaching-learning strategies. All the schools should be well equipped with ICT facilities. If the ICTACLA is integrated in Education & Teacher Education then all the students & Teachers will be benefitted. Creating the constructivist learning environment really makes the teaching -learning efficient & effective. Pre-service teachers opined that in future their all science classes would go through this approach. They will also learn along with the learners and would definitely adopt all facets of the ICTACLA.

f. Designing Constructivist Learning Approach Environment

The Pre-Service Teachers have reflected that Constructivist Learning Approach Environment can be realized through, arrangement of different experiments, demonstrations, providing freedom to the learners in creating and constructing the ideas and experiencing them. Instead of instruction, the students can adopt learning by doing method. All the students' ideas and expressions be accepted and valued and if possible implemented in the class. Providing the learners the opportunities for learning, so that they could think

divergently. Making co-operative learning groups among students and discussing the science concepts makes the learner very enthusiastic. Motivating the learners by providing various learning situations and engaging them in different activities ultimately brings meaningful learning. Going from simpler ideas to complex ones really helps in learning of difficult and complex concepts. Learners need to be provided the learner friendly environment.

g. Problems faced during Practice Teaching with ICTACLA

Pre-service teachers reflected that initially they did not know the approach, but after knowing it was helpful. In the rigid schedule of the course the orientation program was additional to the course, so initially it was difficult to adjust. Less knowledge regarding the computers was another impeding factor. During the preparation of the lesson plans, got confused in selecting the teaching aid, hyper linking the materials, arrangement of the activities and other teaching-learning tasks according to the 5E's and 7E's. How to adopt various evaluative procedures was a challenging task. In the practice teaching the facilities of ICTACLA were not adequately available. It was difficult to adjust initially. Large number of students in the classes made it difficult. Time management was a big challenge. Concentrating on each and every student was difficult. In spite of Smart classes in the schools the administration did not provide the facilities. Lack of motivation of the school teachers was another limitation.

h. Effectiveness of ICTACLA in Science

ICTACLA in Science really works well. Science is a subject of objectivity & exactness. So, through this approach the teacher can work perfectly. Science process skills could be developed very well. Science concepts & higher order thinking could be developed. By use of different strategies in the classroom, like, cooperative learning, teacher can develop co-operative learning skills, expression skills, life skills and values. Demonstrations in the classroom really help to make the abstract concepts very simple and concrete. Providing life like situations helps the learners to think and discuss among themselves. It is based on the principle of learning by doing, so it makes the learners and teachers active and interactive throughout the day. In the post-test students scored very well compared to pre test. The engagement of the students in the activities and their involvement in the classroom was also assessed through observation. Due to use of ICTACLA Pre-service Teachers' knowledge, skills and creativity regarding Science and integration of ICT in Science through Constructivist Approach have been developed. ICTACLA was found to be a Powerful Method of Teaching Learning Science for wholistic development of Teachers & Learners.

i. Suggestions of the Pre-service Teachers on ICTACLA in Science

Pre-service teachers suggested that it is a powerful approach which can be well integrated in the teacher education and school education. Schools and colleges of teacher education must have all the ICT facilities in their institutions. Teachers and Teacher Educators could be oriented on this approach. This orientation program was in second semester of the year, it could be started in the first semester itself, for better integration. Project works could be included for both pre-service teachers and school students.

This type of orientation courses could be conducted for all other subjects also. Action research on such kind of orientation courses could be done in school and teacher education colleges.

Findings

- ICTACLA in Science is really innovative one, through which the teaching-learning in science has become meaningful.
- This is activity oriented and based on the principle of learning by doing. This approach is powerful both for lesson designing & transaction.

- Use of ICT in the constructivist science classes really provides scaffoldings with the earlier knowledge to make new connections.
- ICTACLA develops the creative & constructive faculties of the learners, sustaining their interest & curiosity.
- Doing experiments by the learners is a thrill of joy. Through this the complex, abstract concepts could be made more clear, simple and concrete.
- ICTACLA has been found to be very effective approach of Science Teaching & Learning.
- In some of the schools, though smart, yet the facilities of ICT were not found. It would be better that the School Education and Teacher Education institutes have the well equipped laboratories.
- Online sharing of science experiments and responding to the queries makes Science Learning very lively.
- ICTACAL teachers are self motivated & better prepared.
- ICTACLA creates such a learning environment wherein the learners can think independently and work according to their capabilities and work on own examples, so that their real learning occurs.
- Collecting, organizing, transacting the information collected through internet and integrating within the constructivist framework is really a challenging task.
- Only studying theory does not work unless it finds place for practicing it. So the theories taught in the classroom should find their expression.
- Here is no hurry for completion of the syllabus; ICTACAL covers much more than the syllabus demands.
- Preparation of teaching aids is joyful, one can think divergently.
- There is full immersion of Teachers & Learners in Science through this Approach.
- As it is problem-solving approach, we usually go by simpler to complex, concrete to abstract, induction to deduction, germination to incubation to innovation to creation and construction, which continuously sustains curiosity and passion amongst the children.
- Identifying student's interest and designing the teaching-learning activities accordingly makes all kinds of learners to learn and construct new knowledge.
- ICTACAL facilitates experimentation in natural setting realizing a natural laboratory.

Conclusion

The orientation program based the ICT aided Constructivist Learning Approach in Science and its implementation on the Pre-Service teachers has had substantive returns. It is evident that use of ICTACLA has made the pre-service teachers confident in using this innovative approach in teaching science. The development of the Lesson plans using 5E's and 7 E's has made the Pre-Service Teachers engage themselves completely. Integration of ICT applications into the lessons, engaging in virtual world of science, hyper linking the information with artifacts, discussing through social networking systems, evaluating throughout the classroom, emphasizing on self evaluation has demonstrated how the Pre-service Teachers could be transformed into Teaching Scientists.

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