



# Using Web 2.0 For Collaborative Teaching Learning in Science Education

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## Abstract

The increased availability of inventive computer technology and Internet resources in teaching-learning process for science from the last decade, offers active engagement, the opportunity to participate in groups, frequent interaction feedback and then build new knowledge and connections to real-world contexts to both teachers and students. Adoption of new pedagogy towards collaborative teaching learning within the online environment enables students and teachers to work together as a group. As new technologies are introduced to this environment for collaborative work, it is important to investigate to what extent Web 2.0 tools are being used among students and teachers for making collaborative teaching learning in science education. The researcher selected the Google app as a Web 2.0 tool for this study. The objective of this study was to determine the extent of using Google app among science teachers and science teachers educators for the collaborative teaching learning process in science education.

**Keywords:- Web 2.0 , Google app, Collaborative teaching learning, Science Educaion**

## Introduction

The technological environment within which modern science education operates is becoming increasingly complex; offering new possibilities but also giving rise to challenges. We have seen a continual evolution of technologies and how they are used since the introduction of the Internet. Web tools, virtual worlds, simulations and mobile technologies continue this trend of co-evolution and we are only beginning to develop an understanding of what the trajectory of this co-evolution will be.

The latest web innovations and technologies which have made the Web into a 'Platform' are becoming increasingly applied in the Science Education arena. Tools such as Google docs, Google groups, Wikis (e.g. Wikipedia), Blogs (e.g. Science Blogs), RSS, Video sharing (Khanacademy on YouTube), Massive Open Online Courses (e.g. coursera),

Social Networking Sites (Facebook), Podcasting (e.g. Radio Lab) and many other applications are gradually becoming more popular within science education in teaching and learning.

The Web 2.0 combines the concepts, technologies, and trends that enable users to shares, connects, communicates, collaborates, and creates information on the web (Usman and Oyefolahan, 2014).

The use of Web 2.0 tools for educational purpose is rather a new idea, and a huge opportunity for science education and lifelong learning, its potential is still to be exploited. Yet their huge potentials have been fully explored.

Dillenbourg (1999) defined that collaborative learning is a situation in which two or more people

learn or attempt to learn something together to learn something together.

Hiltz (1998) stated that collaborative learning is not a new concept to education but has found even greater use within online learning because it is viewed being dynamic, student centered, interactive, and for supporting knowledge – building.

### **Why to use Web 2.0 in Science Education**

Web 2.0 makes web more interactive and social which motivates students to create, share, publish and work together in collaborative groups. Vygotsky (1978) said that “learning is a social process and the learners get benefits from the teacher or colleague”. “Web 2.0 tools makes easy to publishing the information and students put great effort to his/her work when he/she knows that this work will be available in the internet” (Simões & Borges Gouveia, 2008). It has been suggested that Web 2.0 tools provide opportunities for effective knowledge generation, knowledge sharing, collaboration, learning and collective decision making within an education context due to their ease of use, portability, rapid development and deployment time (Saeed & Yang, 2008). Generally Web 2.0 technologies have the potential to help managing knowledge in a technology driven way, but the main challenge is getting people to actively participate in community and to share knowledge (Efimova, 2004).

A research conducted by National Training Laboratories for Applied Behavioural Science in Bethel (2006), Maine, developed learning pyramid which shows the effectiveness of different teaching method.

According to the Pyramid of Learning, Lecturing, which is most common form of teaching as a way to impart knowledge and key concepts, retains only 5% of what is heard and is considered as worst. In the lecture method student take notes about lectures, learn them and present them in exams and forget maximum out of them thereafter. The traditional lecture and learn model is not effective as the sole method of learning. On the other hand “Teach others” method contains 90% of avg. retention rates which encourages deep learning rather than surface learning. Thus it can be seen that we should provide our science educational communities the opportunity and environment to practice, discuss and use the knowledge learned in the classroom. Web 2.0 concept points us the correct way for developing such environments. It also builds collaboration oriented environments where we can form a large science learning community including professors, students and stakeholders from all over the world. Students are no longer passive listeners in such an open learning community. They get vast opportunities to interact with other people with similar interest and on the same topic. Active learning connects students to online communities which enhance more memorable learning experiences than less interactive environments.

For this study, the researcher has selected Google App as a collaborative Web 2.0 tool, commonly used in science Education.

Google Apps for Education is a comprehensive set of communication and collaboration Web 2.0 tools that includes email, calendar, and documents. More than 50 million students, teachers, and administrators in schools around the world use Google Apps for Education (Cinthya Mohr 2018). The Google apps can be of great use to educational organizations.

### Significance of the study

The purpose of this study is to explore the technological knowledge and its use among Science teachers and Science Teacher Educators. To better prepare learner for the science and technology in the 21st century, the current science education reforms depends science teachers to integrate technology and inquiry-based teaching into their instruction. Teacher educators are the most important link in the qualitative teacher preparation process. Teachers undergo pre-service training, in-service training and the special training designed for them to enhance their professional growth. Hence the quality of teachers depends on the qualification of teachers educators input vis-

### Literature review

The Web 2.0 combines the concepts, technologies, and trends that enable users to share, connect, communicate, collaborate, and create information on the web (Usman and Oyefolahan, 2014). Waller (2013) discussed “the use of Web 2.0 among the secondary school science teachers in England by providing the two tasks for completion by using Web 2.0 collaborative online application”. Kiyici (2012) reports on “the usage of Web 2.0 tools by science teachers in their classroom. It has been suggested that Web 2.0 tools provide opportunities for effective knowledge generation, knowledge sharing, collaboration, learning and collective decision making within an education context due to their ease of use, portability, rapid development and deployment time (Saeed & Yang, 2008). Anderson (2007) discussed that “Web 2.0 is a series of powerful ideas that are changing the way some people communicate”; in support of this view, Breeding (2006) also noted that this new image of the web enables greater interactivity,

viz. Thus there is an emergent need for teacher educators also to update themselves about the newer technologies such as Web 2.0. The level of classroom interaction during pre-service course also largely depends upon what level of technology a teacher educator uses, so that their trainees’ competencies will further be enhanced when they join the teaching profession and also they have the opportunity to implement the same during their internship. It is an established fact that in-service or refresher courses are organised on a regular basis to upgrade the skills of in-service teachers. Again, the teacher educator becomes the pivot link in implementing the same. Thus, the teacher educator is also included in the sample to find the ground realities and the linkage between the teachers and teachers education in respect of technology in terms of theoretical perspective and practical knowledge.

“The field of science and technology improves every day and to cope up with the changing scenario the educators and the students must update themselves with the ever changing knowledge”. For this, they must be aware of the use of different web tools. This study focuses on this awareness or skill of the science teachers and science teacher educators in using the web tools to improve their knowledge and to check the application and use of this knowledge in an appropriate manner

more user control of information, personalization, the development of online communities, and more open forum for user generation of information. Ma and Harmon (2006) “Web 2.0 tools support knowledge acquisition, transfer, storage, and application”. Klamm et. al (2007) concluded that teachers’s intervention is also required in collaborative learning. Additionally, Web 2.0 vision, the web is created by those who participate in it. However the teacher can motivate learners towards meaningful participation and contribution only when learners perceive some motive/reward (intrinsic or extrinsic) for contributing. Generally Web 2.0 technologies have the potential to help managing knowledge in a technology driven way, but the main challenge is getting people to actively participate in community and to share knowledge (Efimova, 2004). Collaborative learning is not a new concept to education but has found even greater use within online learning because it is viewed as being dynamic, student-centered,

interactive, and for supporting knowledge-building (Hiltz, 1998).

## Objectives of the Study

The objectives of the study were following :-

- To determine and compare the awareness and extent of using Google App as web based Collaborative Web 2.0 Tools for collaborative teaching learning process by Science teachers and Science teacher educators.

## Methodology

In this study, 'descriptive research design' was adopted by the researcher due to the nature of study. Thus quantitative research methods i.e survey method was employed for the present study. Non-probability sampling specifically purposive technique was used in the collection of data through the administration of structured questionnaires based on Google App for studying its awareness and usage for collaborative science teaching learning by education among target group.

The sampling units were full time science PGTs (Post Graduates teachers) of Rajkiya Pratibha Vikas Vidyalayas (RPPV) schools and Science Teachers Educators from various teacher training Institutes of Delhi, GNCTD.

## Results and data analysis

A comprehensive descriptive analysis comparing science teachers and science teacher educators was done by using Statistical Package for Social Science

(SPSS) version 20. For this, techniques of descriptive analyses were employed in SPSS software so as to present the features of the data collected such as frequencies and percentages. Result were analysed for each item as follow:

1. With respect to the awareness and usage of various apps on Google, it was found that both science teachers and science teacher educators were aware of the various apps of Google except a few but there was a low percentage of usage among the same. Results showed that comparative usage of these various apps of Google were more in science teachers than science teacher educators except in few like Google group.

4. The findings revealed that half of the Science teachers (49.2%) and science teacher educators (55.6%) were rarely using Gmail for communicating (online) with the students and colleagues. While it can also be seen that more than one third of science teachers (37.3%) and less than one third of science teacher educators (26.7%) did not know how to communicate online with students by using Gmail.

2. Regarding the usage of Gmail, more than half of the Science Teachers (55.9%) and Science teacher educators (77.8%) used Gmail for both personal and professional purpose.

5. Interestingly, Gmail was primarily used for sending and receiving emails and also for sending reminders notices, etc. more by the Science teacher educators than the Science teachers. Various applications of Gmail in teaching learning process were new for science teachers and science teacher educators and there were still a few who use them in learning systems in schools and in universities.

3. It was found that half of the science teachers (49.1%) and science teacher educators (57.8%) were using Gmail for sharing science content like video, PPT, etc. with their students. While less than half of the science teachers (46.6%) and science teacher educators (40.0%) used the same with colleagues.

6. It was found that a high percentage of Science teacher educators (73.3%) compared to science teachers (32.2%) were using Google drive for various purposes like administrative work, personal development, and social development, etc. besides academic work. Science teachers may not be aware that besides using the same for academic or administrative work, Google drive was also an innovative digital tool for doing a variety of other



works also which empowered social and personal development among teachers and teacher educators.

7. Additionally it was found that Google drive was not popular among respondents for creating documents, spreadsheets, drawing, presentations, and forms. The respondents may not be aware of the Google drive as an incredible tool which can be used for creating various kinds of documents required in the everyday classroom teaching-learning process.

8. Moreover, less than half of the science teachers (44.8%) and more than three fourth of the science teacher educators (81.8%) were using Google drive for only storage and sharing in the science teaching and learning process.

9. The findings revealed that nearly half of the science teachers and science teacher educators did not

know how to create a survey form, quizzes and tests for evaluation in the Google drive.

10. It was found that nearly half of the science teachers did not know how to use Google drive for conferencing with students and colleagues while half of the science teacher educators rarely use the same for conferencing with their students and colleagues. We can say that the respondents were not aware of its tremendous potential use in the classroom or for conferencing with colleagues

11. Findings depicted that higher percentage of science teacher educators (55.6%) than science teachers (40.7%) did not know how to create and share the common lesson plan with colleagues. While nearly one out of every three respondents of both types seldom create and share the common lesson plans with colleagues. Thus, it was concluded that respondents were not much aware of the common lesson plan.

### Interpretation & Discussion

In this era of science and technology, educational applications that are concerned with the holistic development of the learner, have to find their place in the Web 2.0 tools. The Web 2.0 tools such as Google app not only make teaching and learning effective but is also the most powerful instrument of open resources. However, the Web 2.0 tools such as Google app are still in its early stage especially in India in terms of its use in education. It is due to a range of factors, which are principally technical, institutional and social (Tyagi, 2012, p.31). The effective use of Web 2.0 applications is dependent on academics' familiarity and interaction with these tools, the opportunities they have had for exposure to the applications and their level of skills (Sawant, 2012, p.11).

The result of the present study reveals that the awareness and usage of Web 2.0 tool such as Google app varies among the Science teachers

and Science Teacher educators. The need for technological knowledge along with pedagogical knowledge is important when teaching with technology (Mishra, Akcaoglu, & Rosenberg, 2013). Teachers, from different areas of education can enrich their classroom environment by integrating Google App as Web 2.0 tools in effective manner. Further it can also be used for engaging their students, particularly when it is connected to meaningful in-class peer discussion by providing and encouraging educators to seek out professional development on the use of these tools and how to incorporate them into their classrooms practices. If Web 2.0 tools are properly integrate, these tools can support constructivist learning and social knowledge construction, and help to boost analytical thinking, collaboration, teamwork and professional communication skills. According to Tyagi (2012p. 34) "The faculty members" favourable attitude to use Web 2.0 to positively influence their intention to use Web 2.0.

educators have a relatively familiarity with the Web 2.0 tool such as Google app for collaborative learning in science education but they are not necessarily advanced users and is in infancy stage. Most of them are mainly consumers and not producers of Web 2.0 content. Hence, the need for

### Conclusion

Thus, it can be concluded that there is still a long way to go by the teacher in order to use the Web 2.0 tools in the teaching-learning process. However, science teachers and science teacher

a clearly guided approach with detailed instructions and explanations for effective

integration of teaching learning process in science education

enhance learning of the students and further facilitates its usages.

### Educational Implications

- Science teachers and science teacher educators should motivate their students to use and study material/ content available on the sites of various Web 2.0 tools such and little practice may be a good start to learn.
  - Teachers should communicate the significance of Web 2.0 tools in order to
- Teachers should consistently re-evaluate Web 2.0 services in teaching learning process for creating and managing effective web 2.0 learning environment in the classroom.

- Web 2.0 technology should be an integral part of the refresher courses organized by the respective agency (such as academic staff college, SCERT/ NCERT etc.) as refresher courses is a part of continuous professional development of a teacher.

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