AIRO JOURNALS
Free / Unpaid
Peer Reviewed
Multidisciplinary
International

ISSN:2320-3714
Volume: 4 Issue:1
October 2022
Impact Factor:6.3
Subject: Management

Awareness And Usage of YouTube As An Innovative Web 2.0 tool Among Science Teachers and Science Teacher Educators

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Abstract

Web 2.0 tool motivates students and teachers to create, share, publish and work together in collaborative groups. YouTube as an Innovative Web 2.0 tool can be used for video sharing and is a powerful educational and motivational tool that is being used in today's classroom" (Duffy, 2007). This study focuses on the awareness and skill of the science teachers and science teacher educators in using YouTube as an innovative Web 2.0 tool. In this study, a 'descriptive research design was adopted by the researcher due to the nature of the study. The structured questionnaires were developed for studying the level of awareness and usage of these YouTube as an innovative Web 2.0 tool in science education among the target group. The finding revealed that there is still a long way to go by the science teachers and science teacher educators in order to use YouTube as a Web 2.0 tool in the teaching-learning process.

Keywords:- Web 2.0 , YouTube & Collaborative groups.

Introduction

This is an era of science and technology. Science has extended its services to every walk of life. Thus, Science as a subject has a great importance not only in the day to day life but also in the advancement of the world. That is why the teaching-learning of Science has a special place in the world.

There is an extensive concern about the outcomes of Science Education at the school level in India. Science, especially at the senior secondary level, is very important for students of the 21st century. The focus of senior secondary education has largely been on Science as a practical and empirical subject. Secondary Education is the cornerstone of the education system as it is the gateway to the opportunities to youngsters and benefits of economic and social development.

Development of Science Education in India

Development of techniques in Science, forced educational planners and decision makers to make appropriate changes in teaching and learning of Science. Therefore, all over the world factors which contribute to high achievement in science are of utmost importance. Improvement in student achievement needs many factors to consider. Along with all other factors, the most important and frequently overlooked one is the quality of science teachers.

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In the modern era, the teaching of Science has gained considerable momentum. The National Policy on Education ([NPE], 1986) has an extreme focus on Science Education and recommended that "Science Education should be designed to enable the learner to acquire problem solving and decision-making skills as well as the ability to correlate Science with Health, Agriculture, Industry and other aspects of daily life".

The National Policy on Education (NPE) 1986 also placed complete trust in the teaching community and called for essential improvement in the quality of teacher education. NPE (1986) (as modified in 1992), (MHRD, 1998, p.32) observed that teacher education is a continuous process, and it has to inseparable component i.e. pre-service and in-service teachers' training. At first, the system of teacher education needs overhauling. The new programmes of teacher education was emphasised on continuing education and the requirement for teachers to meet the thrusts had also been envisaged in this policy. This was necessary as in this changing world the role of senior secondary school science teachers has become more and more demanding for proper guidance to the students to open their eyes toward the importance of science and develop their career which is important for the future of the mankind.

In the Indian context, several attempts were made through various policies and commissions such as Secondary Education Commission (1952), National Scientific Policy resolution (1958), Indian Parliamentary & Scientific Committee (1961), UNESCO Planning Mission (1963), Indian Education Commission (1964-66), National Policy on Education (1986), Navodaya Vidyalayas (1986),National Curriculum Framework (2000 & 2005) etc. to understand existing educational structure and on identifying approaches and barriers for making Science Education more innovative.

The present age can be seen as knowledge-based society wherein ICT plays a vital role. The Ministry of Human Resource Development (MHRD) recognised this fact and formulated the ICT policy for School Education in 2004, which also speaks about integration of ICT in Science teaching and learning. MHRD in 2004 has launched a centrally sponsored scheme which provides an opportunities and enhanced ICT skills among secondary students. This scheme provides support to the States to set up ICT infrastructure.NCF (2005) has also "marked the importance of ICT in school education characterised by imparting instructions, collaborative learning, and multidisciplinary problem-solving and promoting critical thinking skills". Eleventh five-year plan (2007-2012) also focuses on integration of ICT in education by the Indian Government which leads to set up a National Mission on Education through ICT (NMEICT). Several innovative ICT related projects have been initiated by NME-ICT for strengthening the e-learning education environment. Some of the innovative projects are **eGyanKosh**, **Flex learn**, **NPTEL**, **CEC** (Consortium of Educational Communication), Institute of Lifelong Learning **(ILLL**), **e-PG Pathshala, NROER, SWAYAM etc.** For empowering student-community it was decided to provide low-cost tablets/PCs, named Akash. In MHRD's 12 five year plan document, a distinct chapter on ICT integration in Teacher Education was included under the Teacher Education section , which focused on the adoption of public software to ensure a free and open environment for teachers which enables them to collaborate with one another to create innovative digital learning resources **(Open Educational Resources)** as well as network with one another to create communities of learning**.** It was revealed in the **MHRD** Annual Report 2014-15 on ICT in Teacher Education that– Ministry of Human Resource Development conducts periodic ICT trainings for Teacher Educators in collaboration with INTEL. Nine such ICT based trainings have taken place since 2015 in which, 216 Teacher Educators from different state such as Assam,

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Bihar, Chhattisgarh, Madhya Pradesh, Meghalaya, Sikkim, Uttar Pradesh, Uttarakhand and West Bengal have been trained.

Evolution of World Wide Web (WWW) and Science Education

A continual emergence of technologies can be seen, furthermore, how they are being used since the development of Internet in day today life. Innovative technologies such as Web tools, virtual worlds, simulations and mobile technologies are continue this trend of emergence and we are only beginning to develop an understanding of these new technologies.

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.RadioLab) and many other applications are gradually becoming more popular within science education in teaching and learning. 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

The earlier web which also known as World Wide Web was introduced by Tim Berners-Lee in 1989 at first and described as techno-social system for interaction of humans based on technological networks. The biggest growth came with the arrival of WWW in 1993 that gave rise to the commercial interest in the internet (Poulter, 1997, p.133).

With the passage of time much more development has been observed on the web as results of which various innovative technologies emerges such as Web 1.0 as a web of cognition, web 2.0 as a web of communication etc.

Web 1.0 can be considered as first generation of the web which according to Berners-Lee, is the read-only web and also as a system of cognition. This Web allows a little user interaction or content contribution and only allowed to search the information and read it. Web 1.0 users are limited to viewing materials that someone has created (Anderson 2007). In Web 1.0 there were very few people involved in the creation of Web pages that contained information of various types for different kind of users. The users could find information by directly going to the source.

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).

As we know that now a days the internet has become popular source of information and Web tools are most popular and commonly used tool on the web among the educators. Thus, it can be concluded that the substantial shift from Web 1.0 to Web 2.0 in Science education is that it empowers teachers and learners for easily collaborate and connect among them.

Need of the study

After Independence, we have seen rapid growth in the technological development which has moved India into prosperity. Innumerable initiatives were taken by the central and state governments in bringing about a boost in the development of technology in education in India. However, it is essential to know how much of the initiatives are being utilised in the education sector and what has been achieved at different levels of education.

These concerns have triggered the researcher to make an extensive study of the effective use of

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technological practices in School Education and Teacher Education. Various innovative technologies are being used across India for different purposes but the researcher intends to focus particularly on the technology where the web 2.0 tools such as YouTube are implied.

In depth investigation of the YouTube as a Web 2.0 tool and its uses in teaching learning in science education are still rare in India. Ample research on the use of various Web 2.0 technologies have been conducted in the context of libraries in both school and college.
This motivates the researcher to explore YouTube as a Web 2.0 tools in teaching learning process and its utility in Science education in the Govt. Schools and Teacher Education institutes in Delhi. This research intends to fill that gap and provide real time data which reveals the status of digital knowledge particularly about Web 2.0 tools among target group.

Literature review

The researcher had reviewed the appropriate articles, research papers and dissertations to explore the Web 2.0 technology in education. The literature related to web 2.0 technologies was reviewed from the last ten years only as technology changes every day.

In India, few universities have undertaken studies to ascertain the extent of usage of Web 2.0 tools among faculty, challenges to use Web 2.0 tools and the barriers in using it in teaching learning process.
In nutshell, the international researchers have undertaken studies in relation to Web 2.0 tools whereas in India, there is a large gap to study the various aspects of education concerned with Web 2.0 tool which is yet to be explored

Objectives of the Study

The following objectives were framed for the present study:-

1. To study the level of awareness of YouTube as an innovative Web 2.0 tool among Science teachers and Science teacher educators.
2. To study the extent of usage of YouTube as an innovative Web 2.0 among 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 YouTube developed for studying the level of awareness and usage of these selected Web 2.0 tools in science education among target group.

The questionnaire consisted of 19 items, mostly closed – an ended questions which focuses on the factors that contribute to the level of awareness and uses of YouTube in science education among the science teachers and science teacher educators. In majority of the questions, the standard five-point Likert ranging from highest to lowest was used to provide the respondents with the opportunities to know their positions.
The sampling units were full time science PGTs (Post Graduates teachers) of Rajkiya Pratibha Vikas Vidalayas (RPPV) schools and Science Teachers Educators from various teacher training Institutes.

RPVVs are government schools, run by the Directorate of Education, Government of Delhi. There are 22 RPVV schools which provides education from VI to XII standard. These are the elite Government schools in terms of student's achievements.

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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:-

Table1. Distribution of Respondents having account on selected Video Sharing Web 2.0 tool (YouTube)

	Have YouTube Account					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	11	16.7	55	83.3	66	100
Science Teacher Educators	18	38.3	29	61.7	47	100
Total	29	25.7	84	74.3	113	100

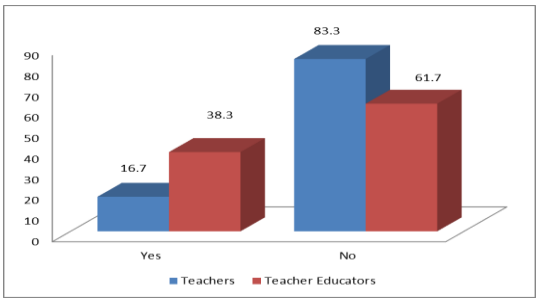

Figure 1. Percentage of Teachers and Teacher Educators having account on YouTube

Interpretation & Discussion

Table 1 & Fig. 1 reveals that a higher per cent of science teacher educators have YouTube account than science teachers. Less than one third of the science teachers (16.7%) and more than one third of the science teacher educators (38.3%) have an account on YouTube. Though it is possible to use YouTube without creating an account but one cannot be able to comment on, like and upload videos to YouTube without the same. If teachers search for videos in preparation for their lesson, they can save the video to the created account, thus eliminating time spent in class to search and select the correct video. (Mullen & Wedwick, 2008, pp. 66-69). Thus it can be concluded that use of the YouTube by science teacher educators may be more frequent, probably to refer to a wide range of topics of high quality content and also could be for developing instructional, topic specific sessions, easily understood and learnable by students at the higher educational level.

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Table 2. Frequency Distribution of Respondents on Hours per week watch of Videos on selected Video Sharing Web 2.0 tool (YouTube)

Frequency of watching YouTube Videos	Respondent Type					
	Science Teachers		Science Teacher Educators		Total	
	N	%	N	%	N	%
0 - 2 hours	37	56.9	7	14.9	44	39.3
2 - 4 hours	10	15.4	2	4.3	12	10.7
4 - 6 hours	15	23.1	20	42.6	35	31.3
6 - 8 hours	1	1.5	18	38.3	19	17.0
8 - 10 hours	1	1.5	0	.0	1	.9
More than 10 hours	1	1.5	0	.0	1	.9
No Response	0	.0	0	.0	0	.0
Total	65	100.0	47	100.0	112	

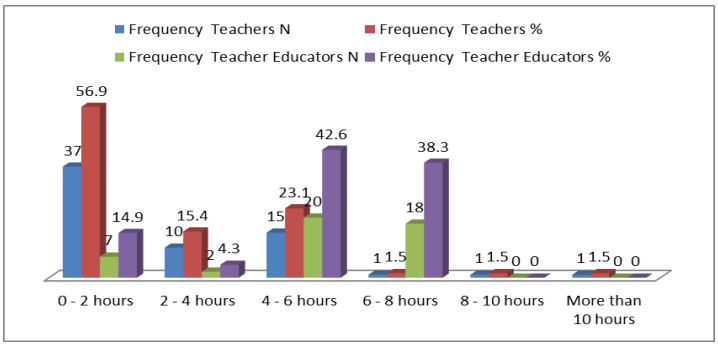

Figure.2. Frequency of watching YouTube Videos per week

Interpretation & Discussion

Table no.2 & Figure no. 2 shows that more than half of science teachers (56%) watch YouTube for 0-2 hrs per week while there is a high percentage of science teacher educators (42.6%) who watching YouTube videos for 4-6 hrs. Thus, it can be said that a greater number of science teacher educators watch

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YouTube videos as compared to the science teachers for the same no. of hrs per week. This may be due to the availability of more time or resources among the science teacher educators in contrast to the science teachers

Table 3. Usage of selected Video Sharing Web 2.0 tool (YouTube) in Science teaching-learning process by the respondents

	Usage of YouTube Videos in Science Teaching Learning Process													
	Always		Mostly		Sometimes		Seldom		Do not know how to use it		No Response		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Science Teachers	4	6.1	17	25.8	25	37.9	15	22.7	4	6.1	1	1.5	66	100
Science Teacher Educators	1	2.1	9	19.1	35	74.5	2	4.3	0	0	0	0	47	100
Total	5	4.4	26	23.0	60	53.1	17	15.0	4	3.5	1	.9	113	100

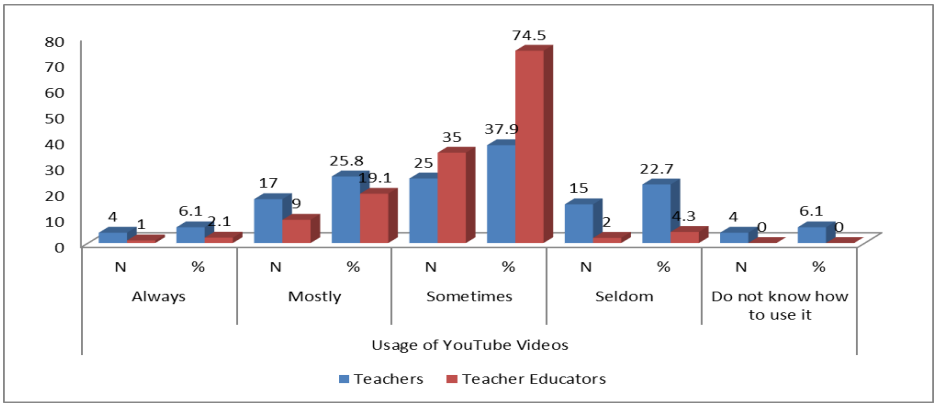

Figure 3. Usages of YouTube in science teaching learning

Interpretation & Discussion

It can be inferred from table no. 3 & fig no. 3 that more than one third of Science teachers (37.9 %) and three fourth of science teacher educators (74.5%) use YouTube sometimes in the science teaching-learning process. However, 6.1% of science teachers do not even know how to use it in teaching-learning process. We can conclude by

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saying that more percentage of science teacher educators use YouTube than science teachers, in the science teaching learning process. Various factors may contribute towards this, such as familiarity of YouTube as an academic tool, availability of resources etc. Learning with multimedia elements such as videos has been shown to be effective for learning activities (Dorothy et al. 2013, p-1119)

Table 4. Selected Video Sharing Web 2.0 tool (YouTube) Videos used by the respondents in the Teaching-Learning Process

	Respondent Type					
	Science Teachers		Science Teacher Educators		Total	
	N	%	N	%	N	%
Classroom teaching by using downloaded videos from YouTube	21	31.8	2	4.3	23	20.4
Classroom teaching by using live videos from YouTube	8	12.1	0	0	8	7.1
Sharing already downloaded videos with students via email, facebook and watsapp	40	60.6	40	85.1	80	70.8
Sharing through any other informal mode (family, friends etc.)	6	9.1	11	23.4	17	15.0
Sharing through any other formal mode (Smart boards in classroom)	2	3.0	6	12.8	8	7.1
All the above	4	6.1	1	2.1	5	4.4
Total	66	100	47	100	113	100.0

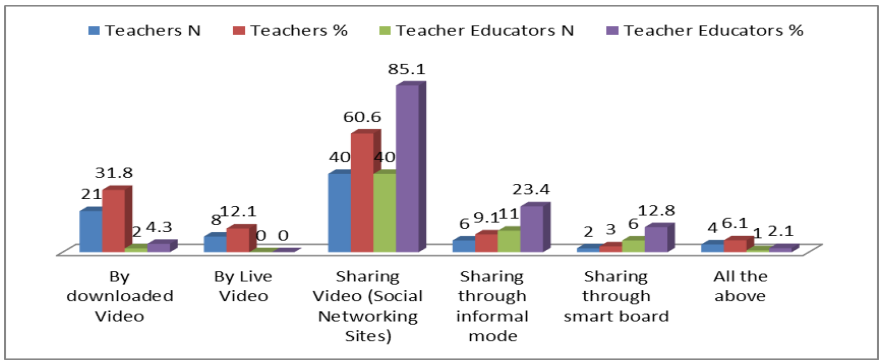

Figure 4. Use of YouTube videos in teaching learning process

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Interpretation & Discussion

Table 4 & Fig. 4 depicts that the majority of Science teachers (60.6 %) and science teacher educators (85.1%) share already downloaded videos in science teaching-learning process, with students through various apps whereas a higher percentage of science teachers (31.8%) than science teacher educators (4.3%) use downloaded videos from YouTube directly among the students in classroom teaching. Thus it can be seen that a majority of the respondents use downloaded video via sharing through various apps among students while in the classroom teaching learning, very few percentage of respondents use downloaded videos directly among the students. This may be due to the ease of sharing the videos through various apps.

Table 5. Distribution of Respondents using source/website other than selected Video Sharing Web 2.0 tool (YouTube) for downloading videos related to science education

	Use of any other source/website other than YouTube for downloading videos related to science teaching					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	18	27.3	48	72.7	66	100
Science Teacher Educators	7	14.9	40	85.1	47	100
Total	25	22.1	88	77.9	113	100

Interpretation & Discussion

Table no. 5 shows that three fourth of science teachers (72.7 %) and science teacher educators (85.1 %) were not using any other websites for downloading science-related videos except YouTube. It may be due to the countless videos that can be found there, aligned with expected learning outcomes that could be appropriate for the learning audience or lack of awareness of other video sharing sites. Moreover, YouTube is more easy to use than any other website and also it is one of the popular video sharing web 2.0 tool. Most of the videos on YouTube are free to use for all. "YouTube is the world's most popular online video site, with users watching 4 billion hours' worth of video each month. Uploading 72 hours' worth of video every minute" (Norlidah et.al. 2013, p-13).

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Table 6. Distribution of Respondents using science pedagogy/content related videos sharing websites other than selected Video Sharing Web 2.0 tool (YouTube)

	Use of any other science related video sharing website other than YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	11	16.7	55	83.3	66	100.0
Science Teacher Educators	4	8.5	43	91.5	47	100.0
Total	15	13.3	98	86.7	113	100.0

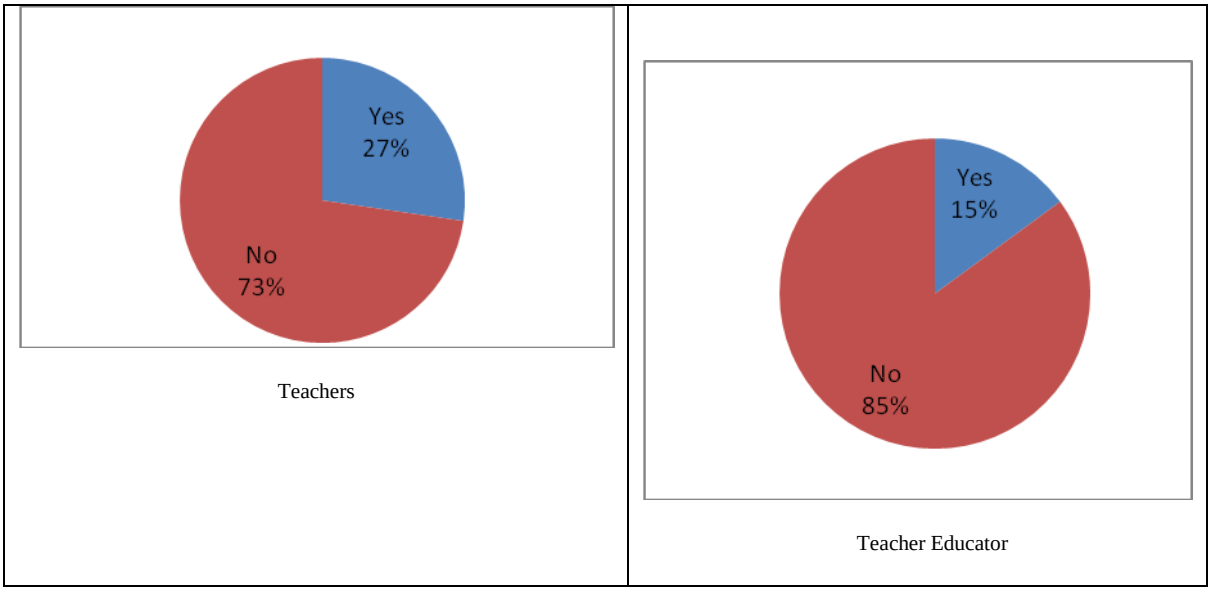

Figure 5. Respondents using other science pedagogy related videos

Interpretation & Discussion

Table no. 6 & Figure no. 5 illustrates that more than three fourth of science teachers (83.3%) and science teacher educators (91.5%) do not use any other video sharing website for science pedagogy related videos other than YouTube. It might be due to lack of awareness or lack of open accessibility to other science pedagogy related videos unlike the YouTube, which is an open resource for all. Clifton and Mann (2011) found

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International
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that "the use of YouTube videos increased student engagement, critical awareness and deep facilitated deep learning. Furthermore, these videos could be accessed at any time of the day and from anywhere" (p. 313).

Table 7. Distribution of Respondents using selected Video Sharing Web 2.0 tool (YouTube) videos while delivering difficult science pedagogy/content in a meaningful and effective way

	Use of YouTube Science videos while delivering Science Concepts in a meaningful and effective way													
	Always		Mostly		Sometimes		Seldom		Do not know how to use it		No Response		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Science Teachers	2	3.0	12	18.2	29	43.9	14	21.2	8	12.1	1	1.5	66	100
Science Teacher Educators	1	2.1	3	6.4	38	80.9	5	10.6	0	.0	0	.0	47	100
Total	3	2.7	15	13.3	67	59.3	19	16.8	8	7.1	1	.9	113	100

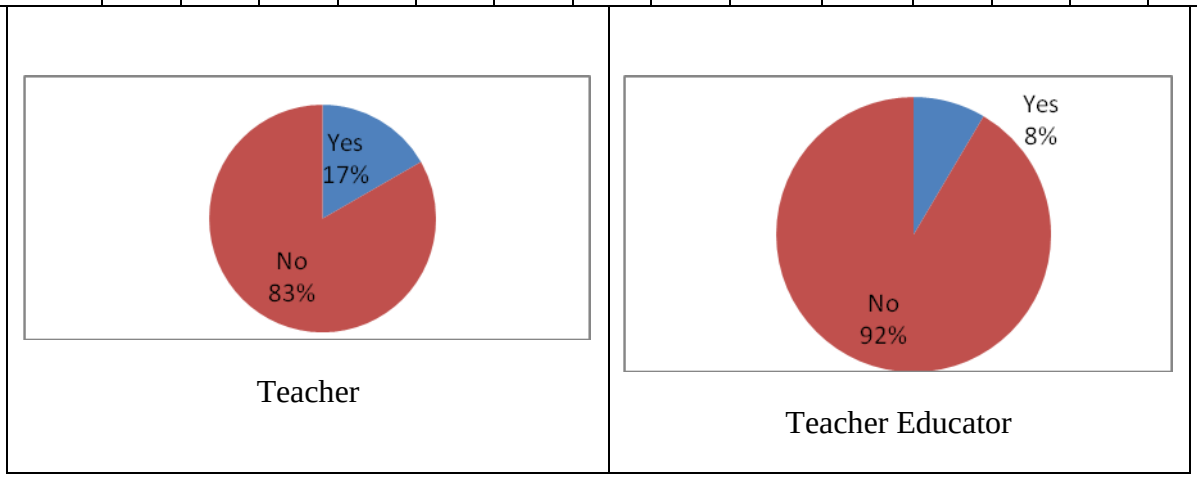

Figure 6. Respondents using YouTube while delivering difficult content

Interpretation & Discussion

Table no. 7 & Fig. 6 shows that less than half of science teachers (43.9%) and more than three fourth of science teacher educators (80.9 %) sometimes use YouTube videos while delivering

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difficult concepts. Mullen and Wedwick (2008) wrote that "anything from a music video to a political speech to an amateur movie can be found on YouTube. With such a wide range of applications, teachers are just beginning to unravel the potential benefits of using YouTube during a lesson". It was also noted from above table 7. that 12.1% of science teachers do not know even how to use it. More percentage of science teacher educators integrates YouTube videos while delivering difficult concepts. This may be due lack of awareness, time, availability, etc among science teachers than science teacher educators. Agazio & Buckley (2009) stated that "YouTube is also used to illustrate theoretical content, involve students, and inspire innovative teaching methods" (p. 27). Furthermore, "these would certainly assist teachers in making the explanation of abstract concepts and processes easy through the use of visualization that can be provided by Videos" (Chee, 1995; Casey,1996)

Table 8. Frequency of Using various features offered by selected Video Sharing Web 2.0 tool (YouTube) among the respondents

YouTube Features	Frequency of use	Respondent Type					
		Science Teachers		Science Teacher Educators		Total	
		N	%	N	%	N	%
Playlist	Always	9	13.6	18	38.3	27	23.9
	Mostly	3	4.5	9	19.1	12	10.6
	Sometimes	9	13.6	19	40.4	28	24.8
	Seldom	10	15.2	1	2.1	11	9.7
	Do not know how to use it	33	50.0	0	.0	33	29.2
	No Response	2	3.0	0	.0	2	1.8
	Total	66	100.0	47	100.0	113	100.0
Subscriptions	Always	2	3.0	2	4.3	4	3.5
	Mostly	5	7.6	0	.0	5	4.4
	Sometimes	8	12.1	7	14.9	15	13.3
	Seldom	9	13.6	20	42.6	29	25.7
	Do not know how to use it	39	59.1	18	38.3	57	50.4
	No Response	3	4.5	0	.0	3	2.7

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	Total	66	100.0	47	100.0	113	100.0
Channels	Always	2	3.0	2	4.3	4	3.5
	Mostly	2	3.0	0	.0	2	1.8
	Sometimes	8	12.1	6	12.8	14	12.4
	Seldom	8	12.1	20	42.6	28	24.8
	Do not know how to use it	45	68.2	19	40.4	64	56.6
	No Response	1	1.5	0	.0	1	.9
	Total	66	100.0	47	100.0	113	100.0
Uploading Videos	Always	2	3.0	3	6.4	5	4.4
	Mostly	2	3.0	0	.0	2	1.8
	Sometimes	10	15.2	22	46.8	32	28.3
	Seldom	8	12.1	19	40.4	27	23.9
	Do not know how to use it	42	63.6	3	6.4	45	39.8
	No Response	2	3.0	0	.0	2	1.8
	Total	66	100.0	47	100.0	113	100.0
Downloading Videos	Always	20	30.3	24	51.1	44	38.9
	Mostly	11	16.7	15	31.9	26	23.0
	Sometimes	14	21.2	6	12.8	20	17.7
	Seldom	9	13.6	2	4.3	11	9.7
	Do not know how to use it	10	15.2	0	.0	10	8.8
	No Response	2	3.0	0	.0	2	1.8
	Total	66	100.0	47	100.0	113	100.0

Interpretation & Discussion

Table 8. elicits the various frequency of using different features offered by YouTube among the respondents. It is worth notable that half of the science teachers (50%) do not know how to use playlist while there is not a single

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ISSN:2320-3714
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science teacher educator which mentions the same. It can be said that Science teacher educators are more aware of this feature. It was also found that less than half of the science teacher educators (40.4%) sometimes use playlist. It may be concluded that playlist is more popular among science teacher educators than science teachers.

As far as subscription is concerned, more than half of the science teachers (59%) do not know how to use it while the less than half of the science teacher educators (38%) opted this. On the contrary, 42.6 % of science teacher educators seldom use subscription as compared to science teachers which was only 13.6 %.

A variation was observed in the percentage of respondents in using YouTube channels. More than half of the science teachers (68.2%) and less than half of science teacher educators (40.4%) do not know even how to use YouTube channel. A total of 42.6% science teacher educators seldom use channels which is comparatively high among science teachers (12.1%).

Regarding the uploading of videos, the majority of the science teachers (63.6%) do not know how to use it but there are an insignificant number of science teacher educators (6.4%) which said the same. While a higher percentage of science teacher educators (46.8%) sometimes upload the videos on the YouTube.

It is notable that there is high percentage of science teachers (30.3%) and science teacher educators (51.1%) who always download videos from the YouTube.

Thus it can be concluded from the above mentioned discussion that science teacher educators are more aware about the different features of YouTube than science teachers. Another reason may be due to the availability of more time or resources among the science teacher educators than the science teachers.

Table 9. Distribution of Respondents knowing about uploading and downloading videos on selected Video Sharing Web 2.0 tool YouTube

	Know how to Upload and download of videos on YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	36	54.5	30	45.5	66	100.0
Science Teacher Educators	42	89.4	5	10.6	47	100.0
Total	78	69.0	35	31.0	113	100.0

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ISSN:2320-3714
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Impact Factor:6.3
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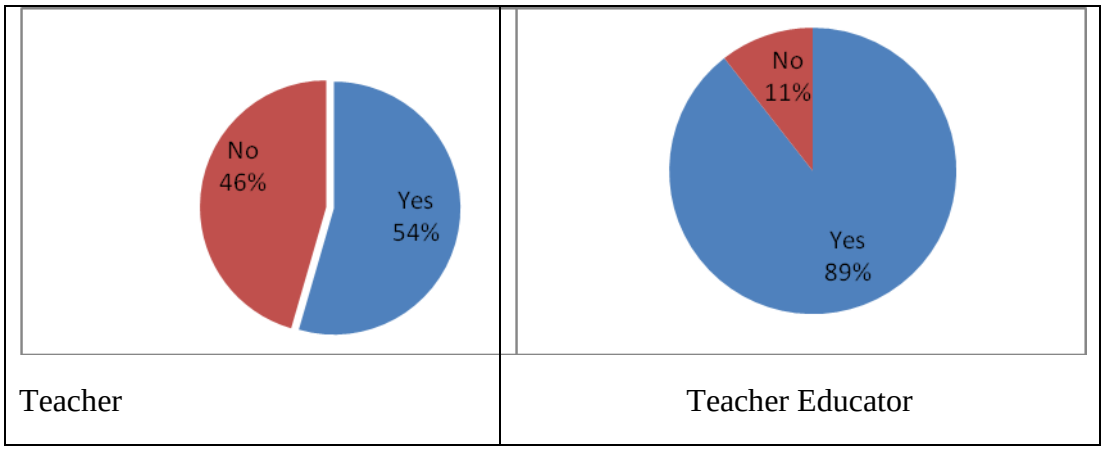

Figure 7. Respondents knowing about uploading and downloading videos

Interpretation & Discussion

Table no. 9 & Fig. no. 7 depicts that more than half of the science teachers (54.6%) and more than three fourth of science teacher educators (89.4%) were familiar with uploading and downloading of videos on YouTube. More science teacher educators are familiar with the same than science teachers. It could be due to lack of interest, awareness, availability of time, etc among science teachers than science teacher educators.

Table 10. Distribution of Respondents who have uploaded the Science Videos or Science based content on selected Video Sharing Web 2.0 tool (YouTube)

	Have you ever uploaded the science videos or science based content on YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	11	16.7	55	83.3	66	100.0
Science Teacher Educators	20	42.6	27	57.4	47	100.0
Total	31	27.4	82	72.6	113	100.0

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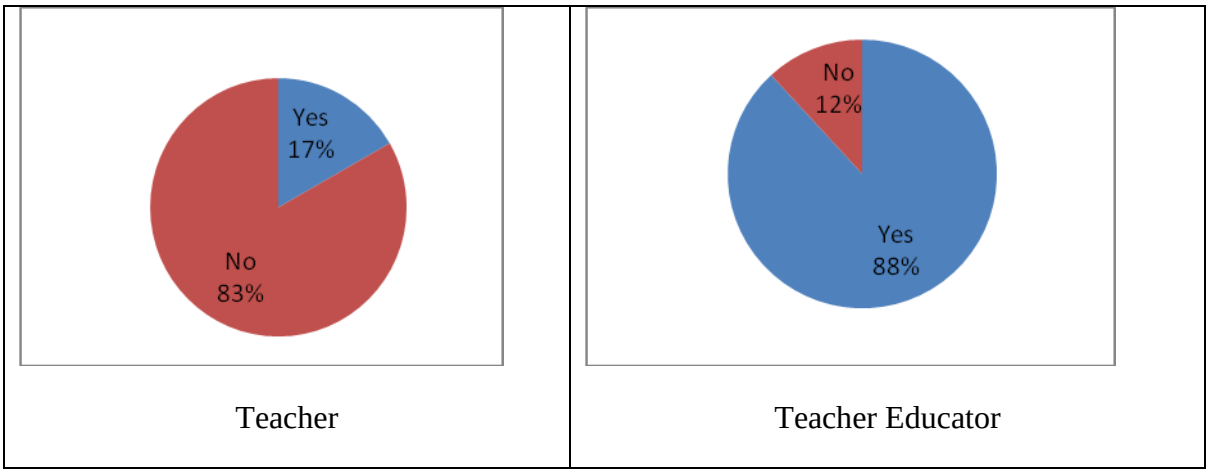

Figure 8. Respondents who uploaded the Science Videos or Science based content on YouTube

Interpretation & Discussion

Table 10. & Fig. 8 reveals that more than three fourth of science teachers (83.3%) and less than three fourth of science teacher educators (57.4%) never uploaded any science videos or science-based content on YouTube though they are familiar with the uploading as mentioned in previous question. We can thus say that the Science teacher educators upload more videos on You Tube than science teachers. This may be due to many factors such as lack of time, resources, need, lack of motivation etc.

Table 11 . Distribution of Respondents who uploaded the self-made Videos or Videos made by others on selected Video Sharing Web 2.0 tool YouTube

	Videos uploaded					
	Uploaded Self made videos		Uploaded videos made by others		Total	
	N	%	N	%	N	%
Science Teachers	3	27.3	8	72.7	11	100.0
Science Teacher Educators	2	10.0	18	90.0	20	100.0

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Total	5	16.1	26	83.9	31	100.0

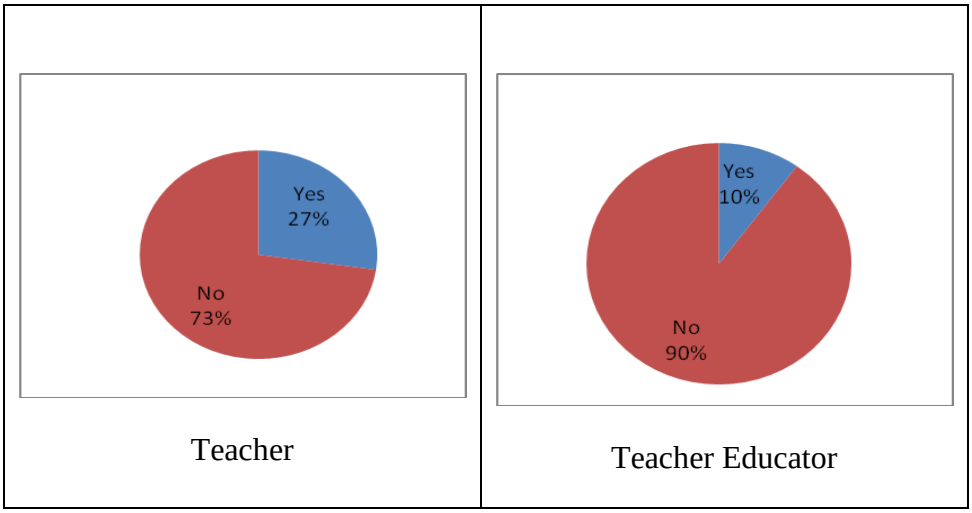

Fig. 9 Uploaded self-made Videos by the respondents

Interpretation & Discussion

Table no. 11 & Fig. 9 represents that less than one third of science teachers (27.3%) and science teacher educators (10%) uploaded self- made videos on YouTube, whereas three fourth of Science teachers (72.7%) and more than three fourth of Science teacher educators (90%) uploaded the videos made by others. Thus, it can conclude by saying that science teachers are more active in development of videos and also upload the same on YouTube than science teacher educators. Yaacob and Kheng (2014) "the availability of educational technologies and self-produced videos placed also had made teaching more exciting" (p.57).

Table 12. Distribution of Respondents who have uploaded Videos on selected Video Sharing Web 2.0 tool (YouTube) with different purpose

	Purpose of Videos Created and Uploaded							
	Class assignment		Personal use		Commercial use		Total	
	N	%	N	%	N	%	N	%
Science Teachers	6	54.5	4	36.4	1	9.1	11	100.0
Science Teacher Educators	0	.0	16	80.0	4	20.0	20	100.0

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Total	6	19.4	20	64.5	5	16.1	31	100.0

Interpretation & Discussion

Table no. 12 reveals that more than half of the science teachers (54.5%) uploaded videos for class assignments while it is surprising to know that more than three fourth of science teacher educators (80%) uploaded videos not for class assignments but for personal use followed by the commercial use which is 20%. Thus, it can be concluded by saying that science teacher educators are more enthusiastic in developing and uploading videos for personal use whereas science teachers create and upload videos to share among students for class assignments.

Table 13 . Distribution of Respondents with the frequency of sharing selected Video Sharing Web 2.0 tool (YouTube) Videos with faculty for Capacity building/Professional development

	Share YouTube videos with faculty for capacity building/professional development													
	Always		Mostly		Sometimes		Seldom		Do not know how to use it		No Response		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Science Teachers	2	18.2	1	9.1	2	18.2	6	54.5	0	.0	0	.0	11	100
Science Teacher Educators	1	5.0	8	40.0	9	45.0	2	10.0	0	.0	0	.0	20	100
Total	3	9.7	9	29.0	11	35.5	8	25.8	0	.0	0	.0	31	100

Interpretation & Discussion

Table 13. elicits that more than half of science teachers (54.5%) seldom share YouTube videos with their faculty while less than half of the science teacher educators (45%) sometimes shares YouTube video with the faculty. Thus science teacher educators actively participate in sharing of videos with their faculty as compared to the science teachers, and the reason for this could be to promote reflection and learning. Wilson (2015) (p.67) "the rapid nature of technology calls for educators to be current with their technological practices and understand students use, relating to the idea of managing digital classrooms. Professional development that is useful and provides hand on practice with technology and tools that can support such learning is essential".

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Table 14. Selected Video Sharing Web 2.0 tool (YouTube) Videos used by the respondents in the Teaching-Learning Process

	Respondent Type					
	Science Teachers		Science Teacher Educators		Total	
	N	%	N	%	N	%
Training in use of YouTube	44	66.7	11	23.4	55	48.7
Sufficient hardware and physical resource	34	51.5	6	12.8	40	35.4
Motivation needed	12	18.2	13	27.7	25	22.1
Provision of time for hand on experience	25	37.9	26	55.3	51	45.1
Total	66	100.0	47	100.0	113	100.0

Interpretation & Discussion

Table 14 depicts that two third of science teachers (66%) were of the opinion that there was a need for training in the use of YouTube videos while more than half of the science teacher educators (55.3%) said that there is lack of provision of time for hand on experience. There is a lack of awareness and skill in using YouTube among science teachers. Thus, there is a need of training for the same among science teachers. Science teacher educators have appropriate knowledge and awareness in using the YouTube tool but there are time constraints in using the same. "The primary reason educators do not use technology is due to lack of experience and confidence" (Lim, Henschel, Jon & Pallett, 2009). Further Wilson (2015) found that "lack of knowledge and understanding about the range of features offered by YouTube among educators often resulting in delays with lesson, loss of student engagement and an increase in distraction while conducting the research study" (p. 8).

Machado & Chung (2015) revealed that "a strong belief of principals of teachers' lack of technical training and competency which was preventing the schools from technology integration".

Table 15. Distribution of Respondents using selected Video Sharing Web 2.0 tool (YouTube) and Other Video based technology as a mode of assessment

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	Use YouTube or other video technology as a mode of assessment for your students					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	18	27.3	48	72.7	66	100.0
Science Teacher Educators	4	8.5	43	91.5	47	100.0
Total	22	19.5	91	80.5	113	100.0

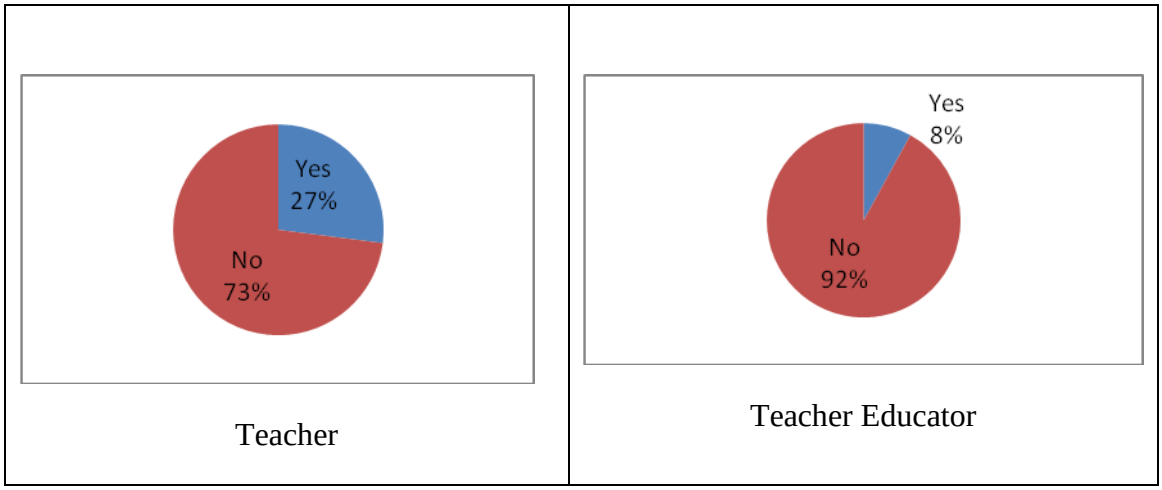

Figure 10. Using YouTube Video technology for assessment

Interpretation & Discussion

Table 15 & Fig. 10 shows that nearly three fourth of science teachers (72.7%) and more than three fourth of science teacher educators (91.5%) do not use YouTube for the assessment of students but from among those who use the YouTube, there are more science teachers using YouTube in assessing the students than science teacher educators. YouTube is an effective tool for assessment. But may be due to the lack of awareness in using this tool for the same, makes science teachers and science teachers educators in using this tool in effective ways.

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Table 16 . Distribution of Respondents who knows how to remove uploaded Videos from the selected Video Sharing Web 2.0 tool (YouTube)

	Knows how to remove uploaded videos from the YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	23	34.8	43	65.2	66	100.0
Science Teacher Educators	40	85.1	7	14.9	47	100.0
Total	63	55.8	50	44.2	113	100.0

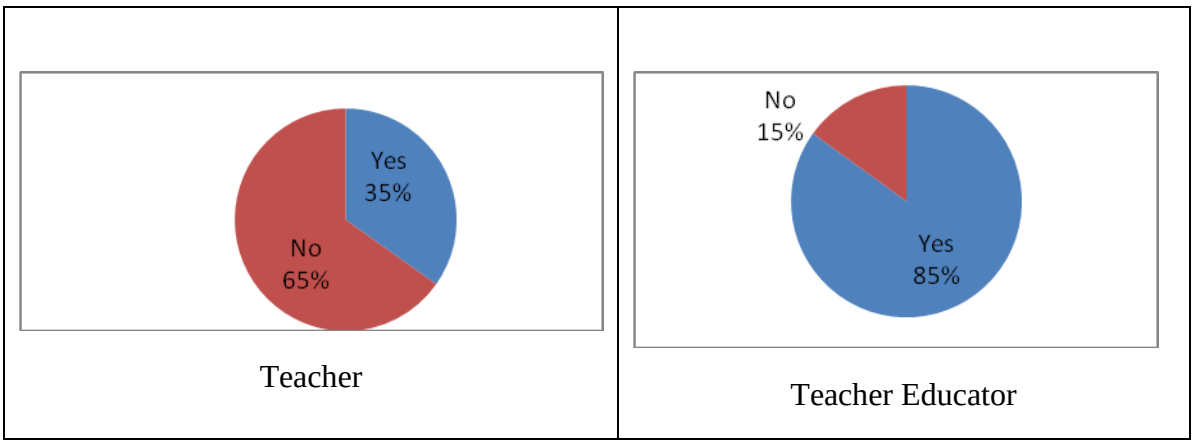

Figure 11 Removing of uploaded videos from the YouTube by the respondents

Interpretation & Discussion

Table no. 16 & Fig.11 represents that nearly two third of the science teachers (65.2%) were not aware about the removing of uploaded videos on the YouTube. On contrary to this more than three fourth of science teacher educators (85.1%) know how to remove the uploaded video from the YouTube. It can be thus, said that more science teacher educators are aware about the various features of the YouTube such as removing of uploaded videos, than the science teachers.

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Table 17. Distribution of Respondents with the awareness about the copyright policy on selected Video Sharing Web 2.0 tool (YouTube)

	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	16	24.2	50	75.8	66	100.0
Science Teacher Educators	41	87.2	6	12.8	47	100.0
Total	57	50.4	56	49.6	113	100.0

Interpretation & Discussion

The table no. 17 depicts that more than three fourth of science teachers (75.8%) are not aware of the copyright policy on YouTube while more than three fourth of science teacher educators (87.2%) who are aware of the same. Science teacher educators are more aware about the copyright policy as compared to science teachers, may be because they know that violating them could mean facing serious legal consequences and that they need to follow certain guidelines during their academic and research work. "Teaching staff may download and copy YouTube videos in limited circumstance under a special exception in the Copyright Act known as flexible dealing (section 220AB), where all conditions of the exception must be met" (Department of Training and Workforce Development, Govt. of Western Australia, 2015,p.2).Thus, teachers must be aware that the copyright policy as it is a legal concept which includes that learning about how it applies to teachers and students is important not just because of possible – though unlikely legal consequences. Therefore, teachers also need to understand about how they are using copyrighted content in their own materials. Teacher should follow and also explain how they are paying attention to concepts like copyright and plagiarism as part of how they design the lessons for classroom teaching.

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Table 18 Distribution of respondents who knows about the work subject to copyright on selected Video Sharing Web 2.0 tool (YouTube)

	Respondent Type					
	Science Teachers		Science Teacher Educators		Total	
	N	%	N	%	N	%
Audiovisual works - TV shows, movies & online videos	4	25.0	0	0	4	7.0
Sound recording and musical composition	4	25.0	0	0	4	7.0
Written works - Lectures, articles, books & musical compositions	5	31.3	0	0	5	8.8
Visual works - Paintings, Posters & Advertisements	0	.0	0	0	0	.0
Video games & Computer Software	1	6.3	0	0	1	1.8
Dramatic works - Plays & Musical	2	12.5	0	0	2	3.5
All of the above	8	50.0	41	100	49	14.0
None of the above	0	.0	0	0	0	.0
Total	16	100.0	41	100.0	57	100.0

Interpretation & Discussion

It can be seen from the table no.18 that among the respondents who are aware of the copyright policy on YouTube, 50% of the science teachers exactly know about the work subject to copyright by selecting “All of the above” options.

Table 19 . Distribution of Respondents with the awareness about the fair use policy o selected Video Sharing Web 2.0 tool n YouTube

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	Awareness about the fair use policy on YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	14	21.2	52	78.8	66	100.0
Science Teacher Educators	22	46.8	25	53.2	47	100.0
Total	36	31.9	77	68.1	113	100.0

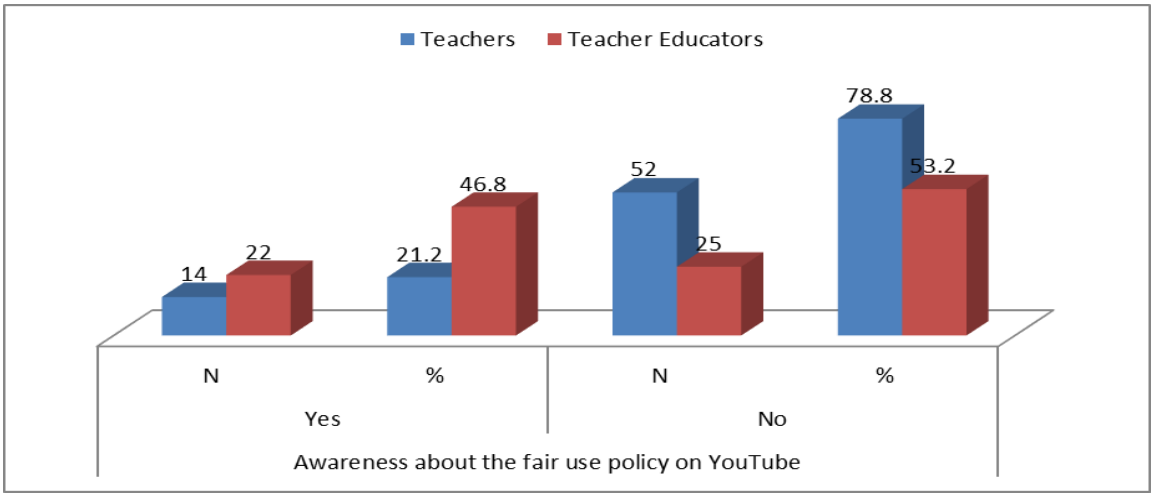

Figure 12 Awareness about the Fair use policy on YouTube

Interpretation & Discussion

It was found from the table no. 19 that more than three fourth of the science teachers (78.8%) and half of the science teacher educators (53.2%) are not aware of fair use policy of on YouTube which says that use copyrighted work must be in a fair and responsible manner. Thus, it can be said that there is an insignificant number of science teacher educators (46.8%) who are still aware of the fair use of the copyright policy. Gallagher et al. (2018) blogged that "teacher and student should also learn about the Fair use policy as it is actually a good practice to use public domain or openly licensed content because students and teachers are more likely to be able to publish their final work online without worrying about copyright infringement".

Table 20. Distribution of Respondents aware about getting permission to use someone else content in their videos or work on selected Video Sharing Web 2.0 tool (YouTube)

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	Permission to use someone else content in your video/work on YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	10	15.2	56	84.8	66	100.0
Science Teacher Educators	28	59.6	19	40.4	47	100.0
Total	38	33.6	75	66.4	113	100.0

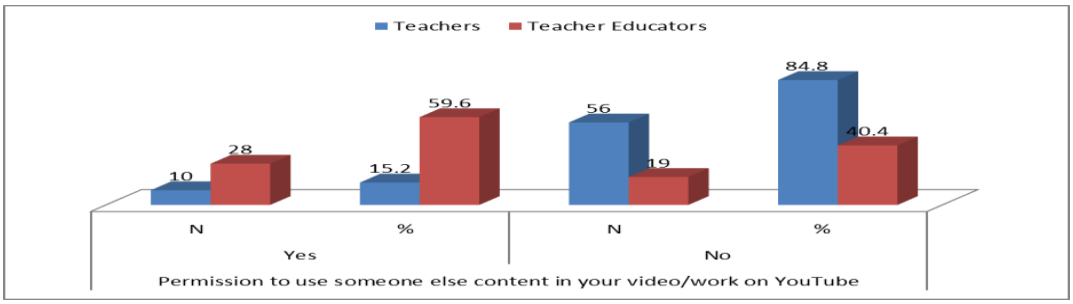

Figure 13 Permission to use someone else content

Interpretation & Discussion

Table no. 20 & Fig. no. 13 that three fourth of the science teachers (84.8%) are not aware about getting permission to use other content which is necessary while developing the videos whereas as 40.4% of science teacher educators are well aware of the fact of obtaining permission for using content authored by another person. The reason for this may be that science teacher educators are more careful of the issues of plagiarism and are aware of the values of original work.

Table 21 Distribution of Respondents aware about creative common licenses/CC on selected Video Sharing Web 2.0 tool (YouTube)

	Know about creative common licenses on YouTube					
	Yes		No		Total	
	N	%	N	%	N	%
Science Teachers	5	7.6	61	92.4	66	100.0

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Science Teacher Educators	13	27.7	34	72.3	47	100.0
Total	18	15.9	95	84.1	113	100.0

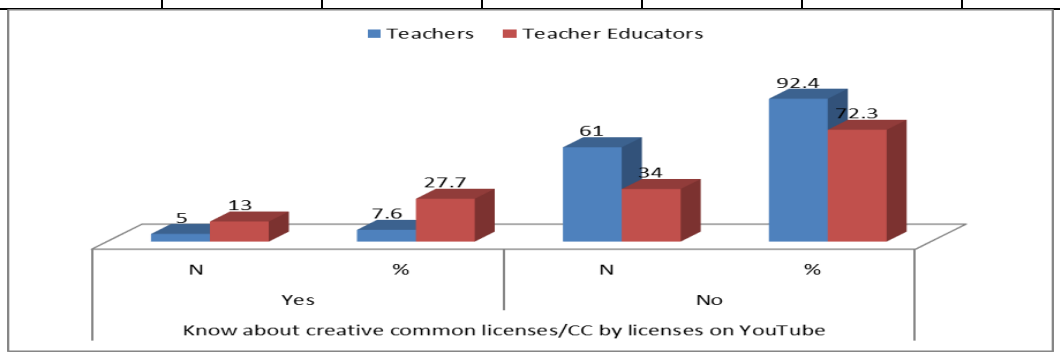

Figure 14 Know about creative licenses on YouTube

Interpretation & Discussion

Table no. 21 & Fig. No. 14 depicts that majority of the respondents are not aware about creative common license/ CC on YouTube. With so much available out there already, when an author wants to give other people the right to share, use, and build upon a work that they (the author) have created, then why not use it for enriching the teaching process. This clearly speaks about the fact that the respondents do not keep themselves abreast of the technicalities involved while using videos on You Tube. Gallagher et al. (2018) stated that "using CC material is good for teachers and students as they can copy on entire work without limitation, lot of CC material that teachers can modify and remix, parents and community can freely access the work and CC material is available for free and not subject to licence fees".

Discussion

1. Surprisingly, a majority of the science teachers (83.3%) and science teacher educators (61.7%) do not have an account on selected Video Sharing Web 2.0 tool (YouTube), while more percentage of the Science teacher educators than science teachers have an account on the YouTube

2. Interestingly, one out of every three science teachers and three out of every four science teacher educators were using YouTube sometimes in the science teaching learning process. Thus, a higher percentage of science teacher educators

3. It has been noted that the majority of science teachers (60.6 %) and science teacher educators (85.1%) were sharing already downloaded videos in science teaching-learning process, with students through various apps instead of using it directly in the classroom teaching.

4. It was found that three fourths of science teachers (72.7 %) and science teacher educators

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(85.1 %) were not using any other websites for downloading and were sharing science-related videos except YouTube.

5. It was observed that a higher percentage of science teacher educators (80.9 %) than science teachers (43.9%) were sometimes using YouTube videos while delivering difficult concepts in the class.

6. Science teacher educators were more aware about the different features of YouTube such as a Playlist, Subscription, channels, etc. Moreover, Science teachers are familiar with basic features of YouTube such as downloading and uploading only.

7. With regard to the uploading of science based videos, more than half of the science teachers (83.3%) and science teacher educators (57.4%) had never uploaded any science videos or science-based content on YouTube. Though, they were familiar with the uploading as mentioned by them.

8. Additionally, among those who uploaded videos on YouTube, a higher percentage of science teachers (27.3%) than science teacher educators (10%) uploaded self- made videos on YouTube

9. Surprisingly, three out of every four science teacher educators uploaded videos for commercial were using while more than half of the science teachers (54.5%) uploaded videos for class assignments than for commercial use.

10. It is worth notable that higher percentage of science teacher educators (54.5%) than science teachers (45%) were sharing YouTube videos with their faculty. Thus, science teacher educators actively participate in sharing of videos with their faculty as compared to the science teachers

11. Findings revealed that two thirds of science teachers (66%) were of the opinion that there was a need for training in the use of YouTube videos while more than half of the science teacher educators (55.3%) said that there is lack of provision of time for hands on experience. There is a lack of awareness and skill in using YouTube among science teachers. Thus there is a need of training for the same among science teachers. Science teacher educators have appropriate knowledge and awareness in using the YouTube tool but there are time constraints in using the same.

12. It was found that nearly three fourths of science teachers (72.7%) and more than three fourths of science teacher educators (91.5%) did not use YouTube for the assessment of students but from among those who use YouTube, there are more science teachers using YouTube in assessing the students than science teacher educators.

13. Regarding the copyright policy on YouTube, Science teacher educators (87.2%) were more aware about the same as compared to science teachers (24.2%). It is a legal concept, learning about how it applies to teachers and students are important not just because of possible – though unlikely legal consequences.

14. Additionally, it was found that more than three fourth of the science teachers (78.8%) and half of the science teacher educators (53.2%) were not aware of fair use policy of on YouTube which says that use of copyrighted work must be in a fair and responsible manner.

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15. Finally, the data depicts that majority of the science teachers (92.4%) and science teacher educators (72.4%) are not aware about creative common license/ CC on YouTube which is yet another legal concept, important for both teachers as well as students.

Conclusion

The Web 2.0 tools such as YouTube is not only make teaching and learning effective but is also the most powerful instrument of open resources. Innovative educators seek new mechanism for creative, engaging and immersive learning experiences that harness the power of flexible technologies. However, the Web 2.0 tools 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).

This study further show that the respondents have a low level of awareness and usage of Web 2.0 for video sharing via YouTube. Nevertheless, YouTube is among most commonly used Web 2.0, however, various features of YouTube are neither being used by teachers and teacher educators nor are they aware of it though, these features can be effective in the teaching learning process. YouTube has a tremendous potential to augment a wide range of aspects of instruction, many of which have yet to be fully explored (Andrea.W.,2015).Besides this, there is a low rate of actively utilized known YouTube features in the science teaching learning process among the respondents. All the respondents had little awareness of the availability of other features that could increase user-friendliness and productivity with the YouTube (Andrea.W.,2015). Respondents reported watching professionally made video contents than producing their own video content, they may not have the necessary levels of technological knowledge to support such creation and integration. The educators need to shift from treating video sharing websites as „virtual libraries" to a space of socializing, commenting, creating and collaborating, which are prominent features of the Web 2.0 tools (Duffy, 2007) . YouTube is used as a video repository to assist both teachers and students.

Although, all the respondents reported that they were using Web 2.0 tools most commonly in their teaching practices, one could argue that they are not advanced in this process, and therefore put more focus on their levels of technological knowledge resulting in the findings of this research is focussed on technological knowledge as opposed to pedagogical and content knowledge. The need for technological knowledge along with pedagogical knowledge is important when teaching with technology (Mishra, Akcaoglu, & Rosenberg, 2013). The educators need extensive time and experience to develop a broader understanding of technology and to develop meaningful ways to integrate it into their teaching practices in a way that makes them feel comfortable and confident. There is a need for educators to adopt digital classroom in this technological era. With classrooms becoming increasingly connected to the digital world, classroom management techniques that are targeted towards this new way of learning are needed to ensure that students are on the task and representing themselves in a safe, respectable manner. Copyright relating to the use of technology is another issue that educators need to take into consideration when using technology and showing students contents that are not their

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own. The research needs to be more comprehensive regarding copyright policies, which is difficult as there is no common policy for all teachers, and also because technology itself and the available internet resource, both evolve continually.

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 educators have a relatively familiarity with the most commonly used Web 2.0 tools 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 a clearly guided approach with detailed instructions and explanations for effective integration of teaching learning process in science education.

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 enhance learning of the students and further facilitates it's usages.

- 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.

- Science teachers and Science teacher Educators may use various Web 2.0 tools such as Video Sharing Web 2.0 tool (YouTube) etc. whenever learning is based on videos or discussions. This step helps in improving the effective integration of Web 2.0 tools in teaching learning process.

- 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.

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ISSN:2320-3714
Volume: 4 Issue:1
October 2022
Impact Factor:6.3
Subject: Management

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