A Study of Effects of Uses Youtube Based Study Materials of Mathematics on the Academic Achievement of Students

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Abstract- *Present era is Internet era. ICT (Information Communication and Technology) has become an integral part of all walks of life including Mathematics education. YouTube is an online video sharing service of Google. It is one the important tool of Web 2.0 technology. It can be integrated with classroom study materials for the larger benefits of the students. A study was carried out to investigate the effect of integrating YouTube contents with academic study materials of Mathematics on Academic Achievement of high school students. It was a quasi-experimental educational research, which was designed on the basis of Solomon Four Group. The total sample size was 44 high school students at Indore, in which 22 were in experimental group and 22 were in control group. Simple convenience random sampling technique was used to assign the four groups into experimental and control groups for the study. Researcher developed YouTube's video based study materials of Mathematics as per the syllabus of high schools. These study materials were used for treatment to the experimental groups. For collection of data on the academic achievement, Students' Achievement Test (SAT) was also developed by the researcher. Content and face validity was ensured with the help of experts. Reliability of the SAT was 0.89 using test-retest method. Null hypothesis were formulated, which was tested on the basis of mean, standard deviation and t-test statistic calculated for the data collected on the basis of pre-test and post-test scores of the students in the SAT. It was found that experimental group had increased their achievement to a greater degree than the control group. Result of t-test concluded that difference between the academic achievements of experimental groups and control groups was significant at 0.05 level of significance and null hypothesis was rejected. The findings of the study demonstrated that YouTube based study materials is beneficial in improving academic scores in Mathematics of the students.*

Key Words: *Academic Achievement, High School, ICT, Solomon Four-Group Design, YouTube.*

Introduction

Achievement is a measure of quality and quantity of success one has in the mastering of knowledge, skills or understanding. Academic achievement is designated by test and examination scores or marks assigned by subject teacher. Academic achievement of students at senior secondary level is not only appointer of effectiveness of schools but also a determinant of

the wellbeing of youth in particular and the nation in general. Hence improving students' academic achievement is necessary for promoting economic growth in India. Performance of students in study is an indicator of effective teaching in the subject.

One of the factors that affect students' achievement is the teaching strategy adopted by the teacher. Hence for successful teaching and learning, use of appropriate teaching strategy is necessary. Most of the teaching strategies practiced by teachers are expository and facts oriented assigning learners a passive role. Teachers usually act as dispensers of knowledge while learners listen and make notes. Teaching methods are changing with a tendency of being learner-centred with less focus on the teacher. In the modern teaching environment, the learner is the main focus and is supposed to be responsible for his knowledge. Information communication technology tools such as computers are being integrated in teaching as a way of making learning more learner-centred.

Internet and World Wide Web (WWW) are considered revolutionary inventions in the history of mankind like fire, wheel, agriculture and printing press. Internet is a powerful tool for education and a positive force in their children's lives. The Internet has changed how teachers and students learn in the classroom. Companies like Google, Wikipedia, and WordPress have opened the door to instant exploration of subjects and questions that haven't been available in the classroom before. Students are now able to explore the ancient Egyptian pyramids using Google Maps, see updated facts and information on a wiki, or read a famous explorer's blog posts on their expeditions, all safely from their desks. The Internet has allowed education to expand past local resources, and draw from a vast library of knowledge that organizations and businesses are actively contributing to everyday. Present era of Internet is an era of Web 2.0. The term Web 2.0 is associated with web applications that facilitate interactive systemic biases, interoperability, user-centered design, and developing the World Wide Web. A Web 2.0 site allows users to interact and collaborate with each other in a social media dialogue as consumers of user-generated content in a virtual community, in contrast to websites where users are limited to the active viewing of content that they created and controlled. Examples of Web 2.0 include social networking sites, blogs, wikis, video sharing sites, hosted services, web applications, mashups and folksonomies. For the effective teaching technique, the power of Web 2.0 can be easily integrated with education and teaching. Such integration led to the terms Education 2.0 and School 2.0. These are basically related with participative web. YouTube is an example of important and widely used video sharing site, a tool of Web 2.0. YouTube now operates as one of Google's subsidiaries. It allows users to upload, view, rate, share, add to favorites, report, comment on videos, and subscribe to other users. It offers a wide variety of user-generated and corporate media videos. Available content includes video clips, TV show clips, music videos, short and documentary films, audio recordings, movie trailers, live streams, and other content such as video blogging, short original videos, and educational videos.

Review of Literature

Based on internet searches it is revealed that several researches have been carried out on various aspects of uses of various tools of web 2.0 in education and its impact. According to Chapelle (2003), "Technology has changed the teaching and learning methods as many websites offer opportunities for learners to converse and communicate with native experts and teachers".Shea and Sherer (2011) says, "Many universities have established their own channels on YouTube to view their lecturing videos, and that YouTube is available for students and teachers to use effectively in and out of the classroom to help students learn, stimulate class discussions and achieve learning goals". Trier (2007) states, "The best way to save and retain videos that an individual needs from YouTube is to create a private account on the site, which is free and easy to create, where the individual has only to go to the YouTube page on the Internet, register, and fill out some of the required key information, and then create a user name and password. Then, the individual can keep the videos in the Favorites icon on the same site, noting that this individual, who has his or her own account, can create a list of videos stored in the Favorites list to facilitate subsequent search for specific videos". According to Trier, what distinguishes YouTube is immediacy and availability; the teacher can quickly know whether the video he is in search of it is available or not. Jones and Cutherll (2011) cited the possible uses of YouTube in the educational process, stating that YouTube videos can be used directly in the classroom as part of the teaching process. They can be used to introduce new concepts, display information during instruction, or at the end of the lesson to confirm number-one points. YouTube videos can also be used as an educational resource, where the teacher uses the video as a model for classroom activities and discussions. Chenail (2011) noted that the YouTube site provides students, teachers and qualitative research's experts with a unique stock of videos that illustrates the concepts of basic qualitative research, the availability of opportunities to share qualitative data through interviews and field observations and display the fully completed researches. It also provides qualitative research's researchers with the ability to view and share their own learning resources to interested people. Savas (2012) conducted a study aimed at finding out the impact of video use in the teaching courses of ESL teachers for third year students at the bachelor level at a public university in Turkey, where the sample consisted of (40) male and female students. The study's results showed the usefulness of the use of videos in teaching, as it contributed to improving their skills in English as well as improving their teaching skills of English. Batainah (2010) conducted a study aimed at finding out the impact of video use on thenon-linguistic proficiency for English language learners in universities, where the study population consisted of (760) students specialized in English language and literature at the University of Jordan. The sample of the study consisted of 35 students and the researcher identified the non-linguistic elements, namely: gestures and signs and expressions of the face and eyes. The control group was taught traditionally, while the experimental group was taught using the video, and after two months, a post-exam was conducted, where the results of the study showed that there is a difference between the control group and the experimental group in the test in favor of experimental group. Al-Masri (2014) conducted a study aimed at identifying the impact of

YouTube on the achievement of the ninth grade students in mathematics course in Amman. The results showed that there were statistically significant differences in favor of the experimental group due to the teaching method. The results too showed that there is a statistically significant difference due to the gender of the student and in favor of females. The study also showed that there is a statistically significant difference due to the interaction between the method of teaching and gender in favor of females who were taught with the use of YouTube.

Based on the above, the problem of the study is summarized in the search for the impact of the use of YouTube on students' academic achievement for the senior secondary students.

Objective

The main objective of the study was to know effect of YouTube based study materials on the academic achievements of senior secondary students in Physics.

Hypothesis

H_0 : There is no significant difference between academic achievements of experimental groups 'students (studied with the study materials based on YouTube) and control groups (studies with the traditional study materials of text books) students in class-11 students learning in Physics.

Based on the above main hypothesis, following are the sub-hypothesis (all are null hypotheses): -

H_0-1 : There is no significant difference between the pretest and post test scores of experimental group (to be underwent both pre-test and post-test).

H_0-2 : There is no significant difference between the pretest and post test scores of control group (to be underwent both pre-test and post-test).

H_0-3 : There is no significant difference between the pretest scores of experimental group (to be underwent both pre-test and post-test)and pretest scores of control group (to be underwent both pre-test and post-test).

H_0-4 : There is no significant difference between the post test scores of experimental group (to be underwent both pre-test and post-test)and post test scores of control group (to be underwent both pre-test and post-test).

H_0-5 : There is no significant difference between the post test scores of experimental group (to be undergone only post-test)and post test scores of control group (to be undergone only post-test).

H_0-6 : There is no significant difference between the pretest scores of control group (to be underwent both pre-test and post-test)and post test scores of control group (to be undergone only post-test).

H_0-7 : There is no significant difference between the post test scores of experimental group (to be underwent both pre-test and post-test)and post test scores of experimental group (to be undergone only post-test).

H_0-8 : There is no significant difference between the post test scores of control group (to be underwent both pre-test and post-test)and post test scores of control group (to be undergone only post-test).

Methodology

The study was designed as a Solomon four group quasi-experimental design to study the effect of use of YouTube based study materials of Physics on the academic achievement of class-11 students as follows:

Group	**N**	**Pre-Test**	**Treatment**	**Post-Test**
Experimental Group (E1)	12	O	X	O
Control Group (C1)	12	O		O
Experimental Group (E2)	10		X	O
Control Group (C2)	10			O

For this purpose, the YouTube based study materials based on prescribed syllabus of the school concerned was developed and validated. The validated YouTube based study materials forms as an independent variable of this study. The dependent variable is Student's Academic Achievement in Criterion test in Physics. In order to find out the achievement in Physics among the students, the researcher developed and standardized a Criterion test i.e. Students' Achievement Test (SAT). Reliability of the SAT was 0.89 using test-retest method. In order to have randomization in the sample, the investigator selected two schools. The two experimental and two control groups were identified in both these schools. First group was the experimental group (E1) which received the pretest (O), the treatment (X) and the Post-test (O2). Second group was the control group (C1) which received the pretest (O), no treatment and the post-test (O). Third group was another experimental group (E2) which received treatment (X) and the post-test (O) but did not receive the pre-test. Last group was another control group (C2) that received the Post-test (O) only. Solomon four group design serves to reduce the influence of confounding variables and allow the investigator to test whether the pretest itself has an effect on the subjects. The various combinations of tested and untested groups with treatment and control groups allow the investigator to ensure that confounding variables and extraneous factors have not influenced the results. E1 and E2 were exposed to YouTube based study materials in Physics. C1 and C2 taught Physics using the conventional study materials/text books. Data were collected from the students and tabulated. The statistical treatments viz. mean, standard deviation and t-test using SPSS software package.

Data Analysis

The data collected from the experiments were arranged in an MS-Excel sheet, which was later on converted into SPSS specific format and the data was analyzed in SPSS after importing data in this statistical software package, which are as follows: -

Table-1: Pre Test and Post Test Scores of Experimental Group given treatment (underwent pre-test and post-test both)

Group (Achievement Score)	*N*	*Mean*	*S.D.*	*t-value*	*Remark*
E1 (Pre-Test)	12	13.48	3.36	31.986	Significant*
E1 (Post-Test)	12	49.41	3.02		
**** Test of Significant for the df of 22 at α = 0.05 level. (t-critical = 2.074) [df = N1+N2-2]***					

Table-2: Pre Test and Post Test Scores of Control Group given no treatment (underwent pre-test and post-test both)

Group (Achievement Score)	*N*	*Mean*	*S.D.*	*t-value*	*Remark*
C1 (Pre-Test)	12	15.50	3.08	17.941	Significant*
C1 (Post-Test)	12	35.66	2.38		
**** Test of Significant for the df of 22 at α = 0.05 level. (t-critical = 2.074) [df = N1+N2-2]***					

Table-3: Pre Test Scores of Experimental Group and Control Group (underwent pre-test and post-test both)

Group (Achievement Score)	*N*	*Mean*	*S.D.*	*t-value*	*Remark*
E1 (Pre-Test)	12	13.58	3.36	1.437	Not Significant*
C1 (Pre-Test)	12	15.50	3.08		
****Test of Significant for the df of 22 at α = 0.05 level. (t-critical = 2.074) [df = N1+N2-2]***					

Table-4: Post Test Scores of Experimental Group and Control Group (underwent pre-test and post-test both)

Group (Achievement Score)	*N*	*Mean*	*S.D.*	*t-value*	*Remark*
E1 (Post-Test)	12	49.41	3.02	10.645	Significant*
C1 (Post-Test)	12	35.66	2.38		
****Test of Significant for the df of 22 at α = 0.05 level. (t-critical = 2.074) [df = N1+N2-2]***					

Table-5: Post Test Scores of Experimental Group and Control Group (underwent post-test only)

Group (Achievement Score)	*N*	*Mean*	*S.D.*	*t-value*	*Remark*
E2 (Post-Test)	10	36.70	1.63	20.125	Significant*
C2 (Post-Test)	10	24.70	0.48		
****Test of Significant for the df of 18 at α = 0.05 level. (t-critical = 2.101) [df = N1+N2-2]***					

Table-6: Pre Test Score of Control Group (underwent pre-test and post-test both) and Post Test Score of Control Group (underwent post-test only)					
Group (Achievement Score)	***N***	***Mean***	***S.D.***	***t-value***	***Remark***
C1 (Pre-Test)	12	15.50	2.90	12.362	Significant*
C2 (Post-Test)	10	25.35	1.27		
****Test of Significant for the df of 20 at α = 0.05 level. (t-critical = 2.056) [df = N1+N2-2]***					

Table-7: Post Test Scores of both the Experimental Groups					
Group (Achievement Score)	***N***	***Mean***	***S.D.***	***t-value***	***Remark***
E1 (Post-Test)	12	49.60	3.23	11.727	Significant*
E2 (Post-Test)	10	36.70	1.63		
****Test of Significant for the df of 20 at α = 0.05 level. (t-critical = 2.056) [df = N1+N2-2]***					

Table-8: Post Test Scores of both the Control Groups					
Group (Achievement Score)	***N***	***Mean***	***S.D.***	***t-value***	***Remark***
C1 (Post-Test)	12	35.78	2.29	17.393	Significant*
C2 (Post-Test)	10	25.35	1.27		
****Test of Significant for the df of 20 at α = 0.05 level. (t-critical = 2.056) [df = N1+N2-2]***					

Results and Findings

Based on the data analysis done as above, in order to verify the sub-hypotheses, all the findings of the study are summarized as follows: -

Hypothesis	**Result of Statistic Test**	**Findings (Null Hypothesis Accepted or Rejected)**
H_0-1	Significant	Rejected
H_0-2	Significant	Rejected
H_0-3	Not Significant	Accepted
H_0-4	Significant	Rejected
H_0-5	Significant	Rejected
H_0-6	Significant	Rejected
H_0-7	Significant	Rejected
H_0-8	Significant	Rejected

Conclusions

Following are the conclusions based on the findings of the research-

- It is concluded from the findings that the senior secondary school students in experimental group (given post-test only after treatment) are excelled in the academic achievement than control group (given post-test only).
- It is concluded from the findings that the post test scores of the students in both experimental and control groups (given both pre-test and post-test) are higher than their pre test scores. It implies that both youtube based materials and traditional method have had an impact on students' performance.
- It is concluded from the findings that the pre-test scores of the students in both experimental and control groups (given both pre-test and post-test) are equal. It implies that the students in both experimental and control groups are equal in their academic achievement. The researcher has properly equated the groups.
- It is concluded from the findings that the post test scores of the students in both experimental and control groups (given both pre-test and post-test) are equal. It implies that the students in both experimental and control groups are equal in their academic achievement. The researcher has properly equated the groups.
- A cross comparison of the findings concludes that the post test scores of the students in control group (given post-test only) are higher than the pre-test scores of the students in control group (given both pre-test and post-test). It implies that the traditional materials has had an effect on the achievements of the students.
- It is concluded from the findings that the post test scores of students in control group (given both pre-test and post-test) and the post test scores of students in control group (only post-test) are equal. In the same way, the post test scores of the students in experimental group (given both pre-test and post-test) and the post test scores of students in experimental group (post-test only) are equal. It implies that the students in both experimental and control groups are equal in their academic achievement. The researcher has properly equated the groups.

In nutshell, we can say that the senior secondary students in both the experimental groups have excelled in the YouTube based study materials than control groups which had gone through traditional method in both control groups. It may be concluded that use of YouTube based study materials has significant impact on enhancing the academic achievement of senior secondary school students.

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