A) General Information: -

1. **Name of the Institute:** State Council of Education Research and Training Varun Marg, Defence Colony New Delhi
2. **Details of the Investigator(s):**

Name	Designation	Place of posting at the time of project completion	Present place of posting	Contact No.	E-mail
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3. **Project/ Study Conducted Academic Session:** 2016-17

4. **Institute where Project/Study submitted:** State Council of Education Research and Training Varun Marg, Defence Colony New Delhi

5. **Theme of the Project/Study: Mathematics Education**

6. **Level of the study:** School Education

B) Summary of the Conducted Research work/Project/Study: -

1. **Title:** A Study of Effectiveness of Educational Video Program (EVP) on Classroom Transaction for Students' Learning Achievement in Mathematics

2. **Introduction:** Regular innovative classroom interventions and its effectiveness studies are needed to measure progress in learning and make the learning levels visible in a way that can be understood widely. Strengthening research on classroom transaction and learning achievements is the long-term solution to improve the teaching learning process. Starting with regular research of teacher needs which will determine individual gaps/needs in teachers, high-quality transaction programs need to be deployed for student's achievement. Information and Communication Technology can be used as a tool to provide such high yielding achievement results. The resources available in the National Repository of Open Education Resources (and other open education resources) can be moderated by experts to ensure that high-quality resources – including videos, teaching material and assessment practices. There is a need to research and develop ways to use innovative methods, strategies and technology to drive the change we desire. The focus should be on creating new, high-quality content such as intelligent teaching systems and tools that will help students to enhance basic learning skills. ICT-based remediation programs should be encouraged. This may includes initiatives in school with

academic support from State Council of Educational Research and Training (SCERT) or District Institute of Educational Research and Training (DIET).

Classrooms are considered to be the centers to facilitate learning among children. The NCF2005 considers teachers as facilitators of learning. Students are treated as creative learners. The teachers are supposed to create congenial environment for facilitating learning. This demands creative thinking, planning, organization and management of classroom processes on the part of the teacher. It is very essential that teachers need to be trained in these areas so as to make them the facilitators of learning in real and practical sense. In education it involves teachers, making curricular decisions regarding what students are to learn and instructional decisions regarding the learning experiences to be provided in the classroom.

The stakeholders are always interested to know the outcomes of learning. For each type of stakeholder, the question of concern may be different. Students want to know if they are learning, and if so, how well. Assessment feedback for students should ensure that students know what they can do, and what they cannot and how to correct their mistakes. Families and communities want to know if children are learning and how useful school is as a contribution to community life. Teachers want to know what students are learning, and schools want to know if teachers are doing a good job. Education systems want to know if student learning is consistent with curriculum standards, if schooling is efficient and if students are well prepared for the challenges of life.

Without question, this generation truly is the media generation. Media devices are becoming increasingly portable, and as they spread even further through young people's environments—from their schools to their every span of life. Anything that takes up this much space in young people's lives deserves our full attention. Videos remain the dominant medium of choice. Turning our full attention as educators to this fact requires harnessing the power of Educational Video Programs (EVP) for teaching and learning. Other aspects of video that have been demonstrated to engage students in active learning are its address to multiple forms of intelligence, its use of multiple modes for content delivery and its emotional appeal to viewers. One of the greatest strengths of video is the ability to communicate with viewers on an emotional, as well as a cognitive, level. Because of this ability to reach viewers' emotions, video can have a strong positive effect on both motivation and affective learning. Not only are these important learning components on their own, but they can also play an important role in creating the conditions through which greater cognitive learning can take place. Videos may help to promote learning in students with high visual orientation in their learning styles. Video can also provide visually-compelling access to information for many learners with learning difficulties who might miss learning opportunities provided solely by print-based materials. In this respect, videos provide important learning opportunities to students working in a second language. First, video-based contexts provide rich sources of information with opportunities to notice sensory images, dynamic features, relevant issues, and inherent problems. Second, they give students the ability to perceive dynamic moving events and to more easily form rich mental models. This advantage is particularly important for lower achieving students and for students with low knowledge in the domain of interest. Third, video allows students to develop skills of pattern recognition which are related to visual and auditory cues rather than to events labeled by the teacher. In sum, video images are ideal for creating a common experience for the teacher and

learner that can be used for 'anchoring' new knowledge. (Bransford et al. cited in Barron, 1989, p. 3)

3. Objectives:

1. To study the effectiveness of using Educational Video Program (EVP) on classroom transaction of teachers.
2. To study the effectiveness of using Educational Video Program (EVP) on learning achievements among students.
3. To study the teacher perceptions regarding classroom transaction using Educational Video Program (EVP).
4. To determine the perceptions of students on quality of learning experiences while using Educational Video Program (EVP) for classroom transaction.
5. To suggest measures for improving the learning achievement among students.

4. Hypotheses:

1. Use of Educational video programme has increased the effectiveness of classroom transaction.
2. There is no significant difference in effectiveness of using Educational Video Program (EVP) on learning achievements among students.
3. Use of Educational video programme for classroom transaction in mathematics has changed the perception of students about teaching of the teacher.
4. Use of Educational video programme for classroom transaction in mathematics has changed the perception of teacher about teaching.

5. Research Design:

- **Research method(s):** Experimental research design

- **Population, Sample and Sampling technique:** The sample was purposive and the study was confined to 5 schools of Directorate of Education in South district, Delhi. The study was confined to class IX mathematics subject teaching.

- **Tools and techniques:** Classroom Observation Schedule (COS), Teacher Perceptions Schedule (TPS), Achievement Test (AT) ,Focus Group Discussion (FGD) &Transaction Training Package (TTP) .

6. Research findings:

1. Reviewing the previous knowledge teachers used the EVP effectively to connect their previous knowledge with the current topic. The teachers introduced the lesson very effectively by reviewing the previous knowledge of students as by showing the video in

which different objects from daily use like metro pillar, boxes, pencils etc were shown and relating these shapes to the shape of cylinder becomes very easy and realistic.
2. Teachers paced the concept “Surface area of cylinder” through discussion on shapes similar to cylinder, reflection of cylindrical shape in daily life like metro pillars effectively with the help of EVP.
3. Pausing/Playing on the scene of metro rail and asking the question as how you will find out the area of a cylindrical shape metro pillar and rewinding/forwarding the scenes for more clarity was possible only in this blended mode of teaching.
4. Teachers effectively used EVP to transact the concept with examples and activities as creating cylinder shape by biscuits and revolving flags, folding rectangular paper sheet in cylindrical shape shown in the video; however teachers also recreate the demonstration of activities like paper folding activity to find out the area of cylinder shown in the video.
5. Teachers paused the video in between and generated discussion which was very lively. Teachers also share questions to the learners which were related to the activity shown in the video and also added their own experiences to generate and inculcate better concept understanding among the learners. These teachers also gave various examples of their own and provided in the EVP.
6. The teacher uses EVP to generate conducive climate in the classroom which motivated the learners to ask questions either for seeking clarifications or asking certain queries. As a result learners' participation in the teaching learning process becomes very effective, participatory and democratic while transacting the lesson through EVP.
7. Teachers clarified the queries of students by providing desired answers with the help of EVP by rewinding or forwarding the video whatever required. For reference when student ask how we can find out the surface area of cylinder, teacher shows the scenes of demonstration activity of paper folding and paused where discussion is required.
8. Teachers demonstrated the activities shown in the video according to the requirements for the understanding or clarification about the content understanding.
9. For asking for the queries and active participation in the teaching learning process the learners were reinforced and praised by the teachers during the classroom transaction using EVP.
10. Classroom discussion becomes very constructive using EVP and the blended teaching mode. Hence Teachers also consider the students as partners in learning. It was observed that most of the learners as well as teacher were attentive during class room transaction using EVP.
11. The learners were continuously evaluated by the teacher while showing videos using pausing/playing and rewinding/forwarding techniques by asking questions like “how you will find out the area of a cylinder?, what is the formula of lateral surface area of cylinder?, and many more such questions given in the video”. Here it is worthy to note that EVP provide the teachers enough time to do the evaluation continuously and comprehensively simultaneously while teaching and not only at the end of lesson as observed in traditional teaching style.
12. The topic was concluded by summarizing the main points using EVP by pausing/playing and rewinding/forwarding techniques.
13. EVP generate the ideas for the home assignments like make a list of cylindrical objects you see all around and propose a plan for finding out the area of that object.

14. EVP helps in daily life reflections of concept related activities and objects like water tank, pillar of metro train, lamp posts, many boxes in our house etc. of the activities shown in the EVP. 15. EVP helps the teacher to shift their role as a guide and facilitator.
16. Teachers expressed that students understand the concept through experiential learning. Students learn through hands on activities as paper cutting and other demonstration activities shown in the EVP which supported the teacher in transacting and carrying out the activities in the class. Two teachers expressed that this blended mode of transaction the concept through EVP helps the teacher in effective management of the class in terms of concentration, motivation, discipline and time management.
17. Teachers expressed that teaching through EVP of topic surface area of cylinder was altogether different from to traditional teaching in which the teacher transacts the topic with the help of black board and audio visual aids.
18. The teaching through the EVP in blended mode was effective and the learning becomes sustainable and flow able.
19. Because of psychological and technological affect of EVP, the entire students feel involved in the learning process, the resultant learning was much better than in traditional teaching.
20. All the teachers expressed that teaching through EVP facilitate better understanding of the concept.
21. There was enhanced concentration of students in learning task and the learning becomes joyful in this approach.
22. Further there was no need to manage the class as most of the students were highly engaged in the learning process.
23. The teacher expressed that they felt empowered in transacting the concept through EVP.
24. The transaction process become very easy and granted better understanding as a part of students.
25. The teachers express that in teaching through EVP the scope of playback and paused provide the options to re-play as many times as required until effectively transaction of teaching point. There are lots of scopes to identify student's difficulties in understanding the concepts and to take immediate remedial step to adjust the problems.
26. The mean post score of control group is 4.763636364 and that of experimental group post score is 7.867647059 which clearly show a significant difference in average achievement score and this difference can be credited to significant difference in effectiveness of using educational video program on mathematics on learning achievements among students.
27. The mean difference (post-pre) score of control group in achievement test is 3.4 and that of experimental group is 5.9 which show an incremental change of 2.5.This clearly shows the comparative effectiveness of classroom transaction through EVP and with traditional approach. 28. Comparing the obtained t statistic value (tobt = 16.24057341) to the t critical value (tcv =1.650516748). We can see that | tobt | > | tcv |, hence we reject the null hypothesis of no difference and conclude that there is a statistically significant difference between the pre and post scores of experimental group. More specifically, looking at pre and post scores means, we conclude that the post scores (M = 7.867647059) is significantly more than pre scores (M = 2.007352941).

29. Two-Sample Assuming Equal Variances on the difference between pre-post scores of control and experimental groups the obtained t statistic value (tobt = 6.535959386) to the t critical value (tcv =1.651174514). We can see that | tobt | > | tcv |, hence we reject the null hypothesis of no difference and conclude that there is significant difference in comparative effectiveness of learning achievements of students of control and experimental group. More specifically, looking at difference post scores means, we conclude that the difference post scores experimental (M = 5.837037037) is significantly more than difference mean scores (M = 3.449541284) of control group.

30. On the question "How are you feeling while learning with the EVP?" 60% responded that they feel it very interesting and joyful, 24 % feels provide clear understanding, 14 %feels that their knowledge is enriched and 2 % feels that they were taught more logically while taught through EVP.

31. On the question "What are the new experiences you gained in learning with the help of EVP?" 40 % responded that they experience "Sustainable and effective learning", 25 % experience "more clarity through different activities & examples" shown in EVP, 25 % experience it providing "clear understanding and very interesting" and 10% observed "enrichment in activities shown" and demonstrated by the teacher, while taught through EVP. 32. On the question "What do you study with EVP?" 75 % responded that they study "Types & area of circular, total & curved surface area of cylinder", and 25 % responded that they study "Cylindrical activities & examples" while taught through EVP.

33. On the question "What are the new experiences you gained in learning with the help of EVP?" 40 % responded that the area of cylinder was taught through "Activities & examples", 35 % responded that the area of cylinder was taught through "Drawing formulas", 15 % responded that the area of cylinder was taught through "Discussion supported by EVP" and 10% responded that the area of cylinder was taught through "Effective method/ technique" while taught through EVP.

34. On the question "What were the different activities and techniques shown in the video to understand the topic of Area of Cylinder?" 66 % responded as "Hands on activities", 28 % responded as "Demonstration" and 6 % responded that the area of cylinder was taught through "Blended mode" while taught through EVP.

35. As per the discussion with the students on the question "Tell me the areas of different parts of Cylinder as told in the video?" 60 % responded "Curved & Surface", 20 % responded "Total surface area of cylinder", 20 % responded "Rectangle, circle, wood, pipe, rod, bottle etc." while taught through EVP.

36. On the question "How Area of Cylinder was found out in the EVP?" 45 % responded "By activity", 40 % responded "By formula", 15 % responded "through Demonstration shown in EVP" while taught through EVP.

37. On the question "Can you now find out the Area of Cylinder?" 100 % responded "yes", while taught through EVP.

7. Educational implications:

Finding of the project suggests that teaching mathematics using videos, promote effective learning experiences. Because videos have a huge range of topics, styles, and instructional design qualities, it is appropriate to suggest a specific instructional design for classroom video viewing.

However, a general approach is applicable to most videos. By previewing the video, the educator can determine how best to modify this general approach, and how to arrange a sequence of learning strategies appropriate to the video. A video viewing experience can be seen as a sequence of pre-activity, activity and post-activity. Pre-Activity: Preparing for the viewing experience. For effective learning, learners need to have a sense of how the viewing activity relates to the work they are doing, to their own lives, and to the knowledge they have already gained. Pre-activities can be very directive, or they can involve more open-ended activities. Frequently, they will involve a variety of cooperative or learner-centered activities to attain the goals of orientation to the video.

8. **Scope of the study:**

The following list of suggestions outlines some possible approaches:

• Discuss with students why they are going to view the program, and provide an opportunity for a discussion of the video's educational ideas.

• Relate the video viewing to the topic being studied. Have students brainstorm or summarize their understandings of the topic in preparation for the viewing.

• Focus attention to the relevance of the video topic to the viewer's lives, both through discussions and activities that will help to give a firm context to the video viewing.

• Give students a broad overview of the video content. Have them discuss their ideas about how the topic might be treated in video format, and what key concepts should be conveyed.

• Explain unfamiliar vocabulary.