CHAPTER V: CONCLUSION AND SUGGESTIONS

5.1 Discussion

The study clearly indicates that animation can be used as an effective tool of communication in pedagogy, and if it is used properly, it can improve students’ academic performance in primary education. The experimental research studies conducted here is giving adequate evidence for this. The study conducted among 544 students of primary schools of Karnataka shows that in pre-test of control group, students obtained an average mark of 7.31 and after attending the class conducted using the traditional teaching techniques, they got an average of 10.58 in post-test. The difference (impact of traditional teaching) between the two tests was 3.27. While in experimental group, where animation instructional materials were used in teaching, this difference was significantly higher (4.07). Here an average pre-test score was 7.18. In post-test, after attending the classes conducted using animation, they scored an average mark of 11.25. This suggests that the primary school students perform better when animation is used in class, than they are taught using traditional teaching aids. Z test value of experimental and control group is 2.44631, which is greater than Z critical one tail (1.64485). Hence null hypothesis, ‘The use of animation as a tool of communication in education will not have significant effect on improving student’s performance’ was rejected. As per the Z-test results with 99.3% confidence it can be said that use of animation as a tool of communication in education will a have significant effect on improving student’s performance in primary school education.

The survey conducted among teachers also reveals the same. Almost all the respondents endorsed the statement, ‘use of animation is more effective than traditional communication methods in class room, and it enhances student’s learning’. They agreed this statement with the mean of 3.42 and with the standard deviation of 0.25. Survey result shows that teachers
do not have second thought in accepting the fact that use of animation in education in classroom will be significant and they firmly believe it can be effectively used as a tool of communication for improving students’ performance in primary schools. In other words, the current research, in experiment study and questionnaire based survey, gives sufficient evidence that animation plays an important in improving students’ performance even in developing countries like India.

The study also shows that use of animation has improved the performance of students who belong to diversified socio-economic background. Whether students belong to lower/upper caste, poor/riche, developed/underdeveloped society, these factors do not matter much. It will have a positive effect on everyone irrespective of diversities or differences. In Bidar, one of the under developed districts of Karnataka, difference between the mean score of pre-test and post-test in control group was 2.87. But in experimental group, where animation was used in the teaching, this difference (impact of animation) increased to 3.8. Chamaraja Nagara district, a socially backward district in Karnataka also witnessed similar results. Difference between the mean score of pre-test and post-test in control group in Chmaraja Nagara was 2.46. And in experimental group the performance was significantly improved. Here the difference between the mean score of pre-test and post-test was 5.6. In Bengaluru district, which is one of the most developed districts of the state, difference between the mean score of pre-test and post-test in control group was 3.02. In experimental group, where animation was used the impact of the teaching was higher, with the difference between the mean score of pre-test and post-test is going to 3.78. Even in Dakshina Kannada, which is arguably one of the educationally forward districts of the state, the difference between the mean score of pre-test and post-test in control group was less than experimental group. In control group it was 3.89. But in experimental group the impact of teaching (difference) had gone up to 4.
It is believed that the educational standard of students in Bidar and Chamaraja Nagara districts are comparatively low, which was even reflected in the scores of the pre-tests conducted during the study. But the study clearly indicates there was a substantial improvement in the performance of students when animation was used in teaching. In other districts, Bengaluru and Dakshina Kananda, student’s average mark in pre-test itself was high, and they performed even better with the help of animation.

Irrespective of differences in the medium of instruction, animation plays a crucial role in improving students’ performance. The study observed that both in Kananda and English medium students improved their performance equally when they studied using animation. In Kannada medium, the difference between the mean scores of pre-test and post-test in control group was 3.32. This difference was increased to 3.96 in experimental group, with the use of animation. Performance of English medium students was also on similar line. Here, the difference between the mean scores of pre-test and post-test in control group was 3.23 and in experimental group this difference was gone up to 4.16. When compared with the results of experimental group, between Kannada and English medium, impact of animation in teaching is slightly higher among English medium students (Kannada= 3.96, English=4.16). However, As shown in the table 88 P one tail value for the hypothesis is 0.31567 and Z value (0.47984) of English and Kannada medium is less than the Z critical one tail value (1.64485). Hence, the null hypothesis is accepted and it was concluded that animation will have an equal positive effect on both English and Kannada medium students when it is used as a communication tool in education.
It is assumed that urban students have higher exposure to the modern technology than rural students in developing countries. There is a perception that students coming from urban areas will outperform rural students when they study using modern digital tools like animation. But the current study does not provide any substantial evidence for this argument. The improvement in students’ performance was almost same among rural and urban students when they studied using animation instructional material. Among rural students the difference between the mean scores of pre-test and post-test in control group was 3.37. This difference was increased to 4.35 in experimental group, where they used animation. Among urban students the difference between the mean scores of pre-test and post-test in control group was 3.22. This difference was increased to 3.9 in experimental group. Comparing the difference of average scores between pre-test and post-test in experimental group it can be said scores of rural students is slightly higher than urban students. But, based on the Z test results (see table 89) it was concluded that animation will have equal impact on the performance of rural and urban students.

From several years, girl students are gaining upper hand better than boys in SSLC and 7th standard exams in Karnataka. The same tendency was observed even in this study. In pre-test (experimental and control) female students scored an average of 7.29 marks out of 20, but male students got an average of only 7.21. This shows that girl’s prior knowledge level on the subject was higher than boys in the sample selected. Both of them have enhanced their performance when they studied using animation. The study found that the degree of improvement was much higher in female students than male students. The difference between the mean scores of pre-test and post-test in control group among female students was 3.49. This difference was increased to 4.5 in experimental group, when animation was used. Among the male students, the difference between the mean scores of pre-test and post-test in
control group was 3.05. This difference was increased to 3.7 in experimental group. When comparing the performance of male and female students in experimental group, it was found that Z value (1.90416) is greater than Z critical one tail value (1.64485). Based on these results (see table 90) the hypothesis “use of animation will have equal positive effect on the performance of male students and female students” is rejected. The current research provides enough evidence to believe that female students perform better than boys when animation is used as tool of communication in education.

The present research also found that the degree of effectiveness of animation can vary from subject to subject. In the study, performance of 25 students in three different subjects - Mathematics, Science, and Language was compared. In all three subjects students’ performance was better in experimental group, when compared to control group. The difference between the mean scores of pre-test and post-test in control group in mathematics subject was 1.5. This difference was increased to 2.16 in experimental group, where animation was used. In science subject, the difference between the mean scores of pre-test and post-test in control group was 3.54. This difference was increased to 4 in experimental group.

The difference between the mean scores of pre-test and post-test in control group in Language subject was 2.71. Difference between the mean scores of pre-test and post-test in experimental group in Language subject was 3.08. These results indicate that, in all three subjects animation has played an effective positive role in enhancing students learning. ANOVA results (see table 91) suggest that, as the f value (4.9272) is more than the f critical value (3.124), the hypothesis - animation has equal positive impact on the performance of subject is rejected. From the ANOVA test result it is evident that the impact of animation
instructional material can vary from subject to subject. Here, in the study for example, the positive impact of animation was high on science as the difference of mean in pre-test and post-test was 4. While in Language subject this difference was slightly less 3.08. And in Mathematics it was significantly low, i.e., 2.16. This clearly shows that the animation did improve the performance of students in all the subjects, but the degree of improvement was much less in mathematics, when compared to other two subjects. The questionnaire based survey conducted among the teachers reveals the same. Around 66% of the teachers either strongly agreed or agreed (Mean=2.77) for the view - use of animation for subjects like Mathematics which involves formulas will not be as effective as other subjects.

Teachers also expressed their view that use of animation in education will have several advantages when it is used as a tool of communication in pedagogy. All most all the respondents, with the mean of 3.45, feel that a good animation can improve the quality of communication by focusing on specificity and accuracy of the course content. When animation is used in classroom communication, a teacher can bring students attention to specific topics or areas. An animated arrow mark, an underline or change of color on specific words/areas would increase the accuracy of the message by highlighting it, which will help to improve the overall quality of communication. Besides, unique feature of animation-audio and visual elements can help to send message through multiple channels and make communication process effective. However, even when animation is used as tool of communication it can have ‘noise’ and affect the communication process, which could be detrimental to the students’ performance. Most of the respondents strongly agreed/agreed to the statement that “that if animation contains too much of extraneous material it may affect learning” (Mean 2.94, SD=0.69). From these results, it is clear that teachers support the use
of animation as communication tool in education. And they believe that animation will enhance communication process, if it is designed properly.

Animation can help to improve students’ academic performance in different ways. Survey results, with the mean of 3.44 and standard deviation of just 0.25 strengthen the notion that, there was a consensus among the teachers on the statement that by learning with animation students will understand or memorize better than traditional methods as it involves audio/visual content. According to the most of the empirical studies, animation can motivate students for learning. Even in the current study 97% of the sample teachers either strongly agreed or agreed, with the mean of 3.33 and standard deviation of 0.47, on the opinion that animation can motivate students for learning. Around 88% of the respondents even felt that it can help to attract the attention of students in class. The mean agreement for this statement was 3.37 with the standard deviation of 0.47. The survey results also reveal that teachers believe “Animation can reduce the cognitive load of the students by presenting the complex concept in simpler form”. 86% of the teachers either strongly agreed or agreed for this statement. Only 14% disagreed. The mean was quite high i.e. 3.11.

The animation is often used in the field of entertainment. Using it in the field of education can add an element of fun and entertainment and it can make learning an enjoyable process. It reflected in current study as well. Majority of the respondents had an agreement to the statement that “Animation helps to convert education into ‘edutainment’” with the mean of 3.32 and standard deviation of 0.46. However, some researchers also expressed an apprehension that use of animation will not have positive impact on the performance of students. When students learn with animation they may focus on entertainment aspects and not educational aspects of the content. Hence, a variable was added in the survey in the form
of statement that “if we use animation in education students may concentrate only on entertainment elements, they may not focus on the actual course content”. However, teachers did not have consensus on this statement. As the mean value was just 2.7, this statement was rejected. Teachers also rejected the statement that “animation may overwhelm students in class room but it doesn’t help students to improve cognitive process”. Here, the mean was just 2.53 and standard deviation was 0.46. After analyzing the results of these three statements it’s evident that teachers firmly believe animation will help to add an element of entertainment to education and it can also enhance students’ performance.

There were two statements related to the mode of presentation of animation in the class room. The statement “just playing the animation content in the classroom without teacher’s assistance will not help students” was included in the questionnaire to understand the role to teacher and animation in class room. Around 67% respondents either strongly agreed/agreed to this statement. The mean value was 2.76 and it was accepted by majority of the sample. These results confirm the notion that animation plays crucial role in improving students’ performance but it cannot replace the teachers in classroom. Results of another statement strongly vindicate this view. The statement “Animation will be useful for the students only if the teachers use it as teaching aid in the class” was strongly agreed/agreed by 79% of the sample. Mean value was 3.09 with the standard deviation of 0.51. These results make it clear that in the classroom, for effective communication teacher should be the ‘sender’ of the message and if animation content replaces him, acting as the ‘sender’, students will not get much of the benefit. However, study discloses the fact that if the teacher uses animation as a tool of sending the message in the process of communication, it will enhance students’ performance in primary schools.
Even in the animation if audio visual elements used excessively, it would affect the communication negatively. Majority, 65% of the respondents had an agreement to the statement “Images, texts, sounds that are not related to the theme of the lesson, can affect the communication process adversely in the class”. However, around 34% of the sample did not think so. The mean for the statement was 2.75 and standard deviation was 0.74. There was another statement on the same line. The survey results of the statement “If the animation content is not designed properly it may affect students learning adversely” gives clear view on this. 79% of the people either strongly agreed/agreed on this statement. However, around 21% had disagreement on this view. The mean value for the statement was 2.97. Hence the statement is accepted. However, from these results it is evident that animation will act as an effective tool of communication in education only if the content is designed scientifically.

5.2 Summary of Findings

Animation can be used as an effective tool of communication in modern day class room environment, even in developing countries like India. In the current study, when it is used in primary school education, use of animation had positive impact on teaching and learning process. The use of impact of animation was reflected in performance of the students. Students who studied with the help of animation instructional content, performed better than the students who learnt using the ‘Chalk and Talk’ method in a traditional class room setting.

The use of animation can enhance the quality and process of communication in the classroom. As animation is unique combination of audio-visual element, it assists the teacher to send message through multiple channels and make the process of the educational communication effective. Besides, animation can also improve the accuracy and specificity of the message by highlighting specific topic or area of the course content. Therefore, when
teacher uses animation in the classroom he can easily bring students attention to the specific areas of the subject.

The questionnaire based survey among the teachers revealed that animation is useful in many different ways. Use of animation in education can motivate students for learning. It results in better understanding and memorization of the subject. Animation can reduce the cognitive load of the students by presenting the complex concept in simpler form. Use of animation can turn education into ‘edutainment’ by adding an element of fun and it can make study an enjoyable process in the classroom. However, images, texts, sounds that are not related to the theme of the lesson, or if the content is not designed properly it can affect the communication process adversely and it can hinder students learning process.

Animation can be more effective in enhancing students learning ability and quality of teaching, when it is used as supplementary tool in the process of interpersonal or group communication by teachers in the classroom. But, efficacy of learning process may deteriorate if it replaces the teachers as ‘sender’ of the message in the classroom teaching.

The study notices that use of animation had an equal positive impact on the performance of the students. The students who belong to diversified socio-economic and educational background, students who come from different geographical area, students who study in different medium of instructions, students who have different level of exposure to technology equally improved their performance when they studied using animation. This shows that animation can be used to any of the students irrespective their background and it will help to enhance their performance. Comparing the results of male and female students, it was
observed that both of them had improved their performance while studying using animation, but the degree of improvement was higher among female students.

The study also discloses that effectiveness of use of animation varies with subjects. In the current study, improvement in the performance of the students was noticeably higher in science subject, whereas academic performance in language had shown moderate improvement. The degree of improvement was significantly low in mathematics subject.

5.3 Implications of the Study

The findings of the study allow certain inferences and there seem to be certain possible implications, which can facilitate department of public instruction of Karnataka, researchers, academicians, policy makers, instructional designers and primary school teachers of the state. This study will also be relevant in educational context of national and international arena.

5.4 Limitations of the Study

- The animation material used in the experimental study was prepared by Ajim Premji foundation and was approved by govt. of Karnataka. The researcher had hardly any control over the design and content of the instructional material.

- The instructional material used in the study was designed, almost 10-12 years back, using a simple 2D animation technique. The use of advanced animation technology may bring difference in the impact in education and it can further broaden the scope of the study.
- This study was conducted was only on the students of second, fourth, sixth standard; taking animation instructional content of mathematics, language and science subjects, respectively; as sample.

- Empirical study conducted to understand the merits and demerits of use animation in education is limited only to take the opinion of teachers. More of learning aspects can be identified if higher levels of statistical tools are used.

- Experimental study conducted for identifying the difference in the impact of animation on different subjects is limited only for a small sample of 25 Kannada medium students.

- The teacher, who taught the lessons, belongs to Dakshina Kananda district. His dialect may not be familiar to the students in other parts of Karnataka.

- Lack of availability of literature on use of animation in education from Indian context. Most of the reviewed literature, in the study, is in the context of developed western countries.

### 5.5 Recommendations:

- The research study shows that animation is an effective tool of communication in education. Hence, the Government of Karnataka can recommend making use of animation compulsory in all primary schools, which will improve the academic performance of the students.
- Effectiveness of animation may depend upon the use and the mode of presentation of animation instructional content by the teachers. Hence, for the effective use of animation in primary school education in Karnataka, primary education department should give special training on proper use of animation content to the teachers.

- Many of the schools in Karnataka do not have the basic infrastructure like computers and projectors in the class. Good infrastructure for computer mediated communication should be developed in the primary schools of Karnataka for the effective use of animated instructional content.

- There may be difference in the effectiveness when interactive animation content, animation games or animation presentation materials used for different subjects. An expert committee should be formed by the government to study, to monitor this and animation instructional design should be developed for primary education in Karnataka based on their findings.

- The animation content which is being used in primary schools of Karnataka is prepared using 2D animation technology around ten years back. In the last ten years the field of animation technology has witnessed tremendous growth. Primary education department of Karnataka should consider the use of latest animation technology in their curriculum development.

5.6 Scope for Further Research:

- In the current research, teacher is the sender of the message. Here animation is used as a ‘tool’ for communication in the classroom. If animation instructional
material itself acts as ‘sender’ of the message, effectiveness may vary. It can be studied by comparing two different scenarios.

- Study can further be extended using higher levels of statistical tools to identify the motivational, behavioral, cognitive and psychological factors influencing students while animation is used in primary school level.

- There is difference in the impact of animation when it is used for teaching different subjects. The reasons for this can be studied by focusing qualitative as well as quantitative assessment of the curriculum, teaching strategies and animation instructional materials of these subjects.

- The effectiveness of animation may be dependent on the nature or design of instructional material. Effectiveness of different types of animation instructional design in this regard can be studied.

- The current study is focusing only on use of animation in primary education. The research can be stretched further by comparing the performance of high school students, PUC students, graduation students and post -graduation students when animation is used in teaching and learning.

- The research can be further expanded by doing a comparative analysis of performance of students in developed countries and developing countries like India.
5.7 Conclusion

In the twenty first century, education is integrating with education and engaging the students in the ways which were not previously possible, by creating new learning and teaching possibilities, enhancing achievement and extending interactions with local and global communities. Students live in a world that has witnessed an information explosion, and significant social-economic changes. To handle these multifarious challenges effectively, students should be taught in digital classroom environment.

The technological revolution has opened the floodgates of opportunity, for both students and teachers, stressing upon a significant shift from traditional chalk and talk method to computer mediated classroom environment. New digital tools are making teaching and learning more innovative and interesting. Tools like animation are adding an element of entertainment and fun.

Animation has also the potential to offer new and improved learning opportunities and thus, contributing significantly in improving the access, participation, and performance of all students in the classroom. If it is used right from the primary education level, because it can attract the students towards school, make learning an enjoyable experience, engage students effectively in the class, and consequently improve the quality of education. In a developing country like India, use of these modern pedagogical tools in primary education is even more important than developed countries, because here primary education not only decides a student’s future, but also a shapes country’s fortune.