



# EFFECTIVENESS OF CARTOON INTEGRATED TEACHING ON INTEREST IN AND ATTITUDE TOWARDS LEARNING PHYSICS OF STUDENTS AT SECONDARY SCHOOL LEVEL

**BINDU T V**

Department of Education  
University of Kerala  
Thiruvananthapuram,  
Kerala, India-695014.

## *Abstract*

*Learning a particular subject depend on many factors like cognitive abilities like intelligence and affective domain characteristics like interest, attitude, motivation etc. Education is the most effective tool ever known to make a learner a responsible member of the society. There are many ways with which academic performance of an individual learner can be enhanced. Innovative teaching strategies which enhance interest in learning, attitude towards learning, achievement motivation etc. which in turn help the individual learner to enhance the academic performance. In the present study the investigator tried to find out the effectiveness of cartoon-based teaching in enhancing interest in learning physics and attitude towards learning physics using single group pre-test-posttest experimental design. The study revealed that cartoon integrated teaching enhances interest in learning and attitude towards learning Physics. This suggests that every physics teacher needs to practice various innovative teaching-learning strategies so as to enhance interest and attitude which in turn enhance the academic performance in all school subjects.*

**Key words:** *Interest in learning, attitude towards learning, cartoon integrated teaching.*

## **Introduction**

Education is the most effective tool ever known to make a learner a responsible member of the society. The school is a formal teaching-learning environment created by a society as an established agent of education. In this teaching-learning environment the process of learning is leading to an enhancement in knowledge, skill and attitude among the learners which are the ingredients of a sound personality. The

process of education is concerned with method of teaching and learning in institutional set up and will also acts as a means of socialization. Society is a complex system and as time passes the quantity of knowledge multiplies and to be passed on from one generation to the next. To keep the quality of these great knowledge during the transfer process more selective and effective methods are to be followed in the formal education system. The specialist who is trying to achieve this goal is called a teacher. A teacher gives importance to knowledge transfer along with the personality development of the learner.

Physics, one of the school subjects and belong to fundamental natural sciences, involves the study of Universal laws behind a wide range of physical phenomena and causal explanations for them. While learning Physics, students will become able to construct their own concepts and procedural knowledge relevant to explain the phenomena they are observing in their daily life. In addition to the relevance and intrinsic beauty of Physics, it also helps the students to develop an understanding of the practical application of the subject in other disciplines. With a solid foundation in Physics student becomes able to appreciate new scientific inventions, the quantitative nature of physical phenomena, and the role of Physics in many other disciplines like engineering, medicine, economics, and other scientific and technological fields. Understanding the contribution, issues, and problems related to innovations in Physics will help students to develop a holistic view of the relationship between science, technology, and society.

Secondary School curriculum in Kerala made an attempt to introduce learning of Physics in a real-life context, adoption of diverse learning contexts, learning and teaching strategies, and assessment practices which are intended to appeal to students of all abilities and aspirations and to stimulate interest and motivation for learning among them. It is also expected to make the students able to apply the concepts in Physics they constructed to appreciate the relationship between physics and other disciplines. The overarching aim of teaching physics at the secondary school level is to provide learning experiences for students to develop scientific literacy, scientific attitude, creativity, critical thinking, and logical reasoning ability, interest in learning, motivation to learn science, etc., so that they can participate actively and contribute to innovations in the rapidly changing knowledge-based society. It also tried to prepare the younger generation for further studies leading to career in scientific fields related to Physics and became lifelong learners in Science and Technology.

Enhancing attitude towards learning science is one of the most important expected outcomes of teaching science at secondary schools. Secondary school students are also need to develop scientific attitude, science interest and aptitude in science. An attitude is an emotional reaction towards something or person or action or object or event. It leads to a personal response to a person or object developed through experience which can be characterized by a range from a favourable to unfavourable. Those possess scientific attitude is found to be very curious to know more and more about the cause effect relationship about the natural phenomenon and events in the environment.

## NEED AND SIGNIFICANCE OF THE STUDY

Physics is considered as the subject which deals with the problems within the realm of science and it traditionally attracts lesser of pupils when compared to Chemistry and Biology disciplines. Physics is perceived as a difficult subject for students at Secondary School level and also for adults in the graduate level. Bindu (2019) conducted a study to find out the nature and extent of the relationship of academic hardiness and its components with the attitude towards learning of higher secondary school students on a sample of 361 students. The study revealed that there exists a positive significant low correlation between the two variables. But among the three components of academic hardiness namely: Commitment, control, and challenge, the component control is not correlated significantly to attitude towards learning.

Kamba, Giwa, Libata, and Wakkala (2018) investigated the relationship between science process skills and student attitude towards physics in senior secondary school in Aliero metropolis in a sample of 203 students selected and the study indicated that the students possess low science process skills, the student's attitudes towards physics are good and there is a significant positive relationship between science process skills and attitudes towards physics of students. It leads to the conclusion that students should be exposed to science process skills for the betterment of their future life and society as well. The attitude of students toward physics is good but not enough, as such, positive attitudes of students should be improved so that they can be able to think, reflect and associate with ideas related to physics.

Xavier and Croix (2016) conducted a study to establish the attitude of students towards Physics. The participants in the study were physics students from the first year up to the fourth year. The analysis showed that only 58% of students opting for Physics as optional subject has enrolled voluntarily. Their attitude towards physics is slightly positive. It was found that neither gender, option at secondary school nor level of study influence this attitude. Godwin and Okoronka (2015) found that a significant relationship exists between students' attitude and their corresponding academic performance in physics. Determining students' attitude towards a subject is, therefore, a useful task if one wishes to improve the performance of students in that subject.

Ali and Awan (2014) conducted a study on Attitude towards science and its relationship with students' achievement in science. This study was conducted to examine the relationship of attitude of secondary school students towards science with the achievement in the subjects of Physics, Chemistry, Biology and Mathematics. Data was collected from 1,885 students of 10th grade. Simple correlation( $r$ ), Multiple regression analyses ( $R$ ) and standardized regression coefficients were used to investigate the relationships between attitude towards science and achievement in science. The results of the study indicated that attitude towards science had significantly positive relationship with the achievement of science students at secondary level.

Kaya and Boyuk (2011) through their study came to the conclusion that students' positive attitudes towards science highly correlate with their achievement in science. In the particular area of physics, because of a visible decline in enrollment in physics and a fall in the interest in physics around the world, many researchers have been made to estimate the attitude of students towards physics at secondary schools and at university.

Exploratory research has revealed that students find pleasure in physics course if the students know how to plan and implement the strategic solution to the question through teaching methods. Why is it so important to develop a positive attitude towards learning physics? It is because the attitude towards learning physics is highly correlated with their achievements in physics. Achievement motivation and students' interest are influenced by positive and negative attitude. Positive attitude toward physics had positive attitude towards their physics teacher and vice versa. Science curriculum and Science classroom climate, Science Student's attitude towards science is more likely to influence their success in science course than success in influencing attitude. Many researchers believe that if students are allowed to demonstrate higher cognitive ability through problem-solving, either through a teacher centred approach or a student centred approach, their attitude towards physics might be positively affected. The studies reviewed suggest that there is a relationship between attitude and achievement. Therefore, it is possible to predict the level of achievement from attitude scores although many researchers argue that teaching method has a great impact on students' attitude to learn a subject.

Interest in learning a subject plays a vital role in the academic performance of learners. The experiences they are receiving from their environment, family, school, and teachers decide the value of the interest in learning. If the parents and teachers are satisfactorily explaining their clarifications regarding the natural phenomena they are observing, their knowledge and skills decide the interest. However, the interest in learning does not stay the same, it changes from time to time. Many of the learners are not preferring Physics for their higher studies as they consider Physics a difficult subject (Lavonen et al., 2007; Lyons 2006; Angell et al. 2004; Sidin, 2004 ). Students' interest in Physics has been found to be on the decline across the phases of the study (Murphy &Whitelegg, 2006; Reid, 2003). Many studies have shown that male and female students differ significantly in their interest in physical sciences and female students are possessing a lower interest in science (Murphy &Whitelegg, 2006). It indicates that male students tend to be more interested in learning Physics than female students (Stadler et al., 2000; Alexander et al., 2010). Trumper (2006) conducted a study on Factors affecting junior high school student's interests in Physics. In this study, it was learnt that the interest of students is decreasing in science which is going to vitally affect the scientific literacy of future generations. It was learnt the boys always showed interest towards physics.

From the related studies, it is found that there is a relation between teaching methods and one's interest and attitude towards learning Physics. Secondary school students need an interest in learning and

attitude towards learning to improve performance in the subject and become scientifically fit. Findings of this study help to improve physics teaching-learning process. The study is aimed to find how we can improve one's interest in and attitude towards learning physics. Some of the research questions that come to the mind of an investigator are: Whether cartoon integrated teaching in Physics capable of enhancing interest in learning physics? Whether cartoon integrated teaching in Physics capable of enhancing attitude towards learning physics? and Can achievement in Physics be enhanced using cartoon integrated teaching?

The above research questions emerged in the mind of the investigator forced to conduct a study on interest in and attitude towards learning physics among secondary school students. Hence planned the present study.

In order to learn a particular subject student, needs interest in and attitude towards learning Physics. The present study is an attempt to study whether there is any association between the method of teaching and students' interest in and attitude towards learning physics. The problem under study stated as interest in and attitude towards learning physics are related to methods adopted for teaching secondary school students. Hence the title of the study is "Effectiveness of cartoon integrated teaching on interest in and attitude towards learning physics of secondary school students".

### **OBJECTIVES OF THE STUDY**

The following objectives were formulated for the present study:

- To prepare cartoon integrated lesson plans in Physics.
- To find out the effectiveness of cartoon integrated teaching for enhancing interest in learning physics of secondary school students.
- To find out the effectiveness of cartoon integrated teaching for enhancing attitude towards learning physics of secondary school students.

Learning theories are trying to establish the fact that affective, cognitive, and behavioural aspects of attitude of individual learner. Five dimensions of attitude are taken from Fraser's Test of Science-Related Attitudes (1981) which has been substantially used and validated (Schibeci & McGraw 1981). The most appropriate dimensions for use with a wide range of individuals were planned to include in the measurement of attitude towards learning Physics in the present study and they are Students' Attitude towards learning Physics, career related to Physics, Physics teachers, usage of Physics equipment, physics experiments and learning Physics.

Students' attitude to a subject is expected to enhance the academic performance in that subject. A negative attitude towards a certain subject makes learning difficult, while a positive attitude stimulates

students to do an effort and leads to high achievement in that subject (Velloo & Khalid, 2015). Godwin and Okoronka (2015) showed that a significant relationship exists between students' attitude and their corresponding academic performance in physics. Determining students' attitude towards a subject is, therefore, a useful task if one wishes to improve the performance of students in that subject. The estimation of students' attitudes towards natural sciences has been carried out by many researchers. In their research, Wilson et al. (2000) and Kaya and Boyuk (2011) came to the conclusion that students' positive attitudes towards science highly correlate with their achievement in science. In the particular area of physics, because of a visible decline in enrollment in physics and a fall in the interest in physics around the world, many researchers have been made to estimate the attitude of students towards physics at secondary schools and at universities. Many of them, (Akinbobola, 2009; Alimen, 2009; Mekonnen, 2014) came to the same conclusion that the decrease in Physics academic achievement is alarming. The outstanding factor that caused this is the students' attitude towards Physics (George, 2000).

## METHODOLOGY

Being a physical science teacher educator, the researcher could get many opportunities to interact with secondary school students. From the demonstration phase onwards, the researcher could find that some of secondary school students are not interested in learning physics especially if they are not intellectually bright. But some of the students who are intellectually bright are also not showing interest and attitude towards learning physics. The issue was discussed with the practicing teachers at the secondary level and they were also having the same opinion. The researcher had many interactions with the secondary school students and it could be realized that the main reason founded by the researcher for lack of interest in and attitude towards learning physics is occurred due to the lack of innovative teaching-learning.

During the evaluation of student teachers' teaching performance, the researcher could get an opportunity to observe many classes taken by the in-service teachers and student teachers from the same college and also from other colleges of teacher education. From these observations, the researcher could feel that intervention strategies like role play, cartoon integration, storytelling, experiments, e-resources, virtual labs, augmented reality etc., can bring a drastic change in the interest in and attitude towards learning Physics of secondary school students. The researcher planned cartoon integrated teaching in physics and use an experimental method of teaching-learning continuously during the first phase of teaching practice for about 40 days by one of the student teachers in Physics. Before experimentation, the researcher conducted pre-tests for checking the interest in and attitude of those students towards learning physics using a standardized scale of attitude towards learning physics (Bindu and Meera 2019) and an interest inventory (Bindu 2020).

The researcher decided to integrate cartoons in the lesson plans for the topics "Work, power and energy and Current Electricity" from standard IX syllabus of Kerala state syllabus in the experimental phase.

As part of experimentation, the researcher divided the particular units into fifteen different lesson plans integrating cartoons wherever possible. The researcher carried out the experiment in this particular format with the help of the student teacher's assistance. In the experimental phase the teacher introduced the learning material in the form of cartoons based on the concepts that the researcher planned to transact in the whole class and gave some time to the students for reading and analyzing the particular reading material later researcher asked some questions related to the reading material then followed the experimental method for transacting the main contents and after completing the transaction. This reading material was again given to the students for fixing the concept in their brains properly, this procedure was carried out in the entire transaction of that particular unit and at the end of the teaching practice again conducted a posttest using the same tools in attitude towards and interest in learning physics. The data obtained during the pre-test and post-test were analysed using suitable statistical methods.

### PREPARATION OF CARTOON INTEGRATED LESSON TRANSCRIPTS

The researcher prepared the cartoon integrated lesson plans on the selected chapter "Work power and energy and Current Electricity" from 9th standard SCERT Physics text book. Lesson transcripts for 45 minutes of duration were prepared. Each transcript contained the following steps:

- **Rapport Section:** The teacher showed cartoons to arouse curiosity in the students and elicited response from them. This will indirectly lead to the topic that is to be taken.
- **Concept presentation:** In this session, the teacher presented the concept using cartoons, experiments, Videos and Activities.
- **Individualization:** In this phase, students recorded the observation of the experiments on activity cards and asked them to analysis their observation and drawn conclusion from them.
- **Internalization:** In the session, teacher clarified the doubts for the proper concept formation wherever necessary and the teacher presented the cartoon once again before the class for proper understanding.

### ANALYSIS OF DATA AND DISCUSSION OF RESULTS

Scale of attitude towards learning physics and interest inventory in learning physics were used to collect necessary data. Data collected from the 48 students from the 9<sup>th</sup> standard of a Girls Higher Secondary school in Thiruvananthapuram district before and after intervention were analyzed and presented using descriptive statistics Arithmetic Mean, Standard Deviation, before and after experimentation. Test of significance of difference between correlated groups is applied to investigate the difference in interest in and attitudes towards learning physics of secondary school students before and after experimentation.

### Students interest in learning physics before and after experimentation

Data was analyzed using t-test to find the significant difference between interest in learning physics of secondary school students before and after intervention using cartoon integrated lesson plans.

*Table 1: Mean, standard deviation, t-value and correlation of interest in learning physics before and after using cartoon integrated lesson plans*

	Sample size	Mean	Standard Deviation	t-value	r
<b>Before</b>	48	13.27	4.13	14.90	0.761
<b>After</b>	48	19.23	3.85		

From table it is seen that the t-value value obtained for interest in learning physics before and after the intervention using cartoon integrated lesson plan is 14.90 which is greater than 2.58 the value set at 0.01 level of significance. It indicates that there is significant difference between means of interest in learning physics before and after intervention. From the table it can also be seen that the mean value of the variable interest in learning physics is greater for posttest than pretest. It indicates that the invention is effective in enhancing interest in learning physics.

### Students attitude towards learning physics before and after experimentation

Data were analyzed using t-test to find the significant difference between the attitude towards learning physics of secondary school students before and after teetered using cartoon integrated lesson plans.

*Table 2: Means, standard deviations, t-value and correlation of attitude towards learning Physics before and after using cartoon integrated lesson plans*

	Sample size	Mean	Standard Deviation	t value	Correlation
<b>Before</b>	48	99.93	9.12	12.49	0.759
<b>After</b>	48	115.37	10.1		

From the above table It is seen that the t-value obtained for attitude towards learning physics before and after the intervention using cartoon integrated lesson plan is 12.49 which is greater than 2.58 the value set at 0.01 level of significance. It indicates that there is significant difference between means score on attitude towards learning physics before and after intervention. From the table it can also be seen that the mean value of the variable that is attitude towards learning physics is greater for posttest than pretest. It indicates that the invention is effective in enhancing attitude towards learning physics.

## DISCUSSION OF RESULTS

The present study was conducted with an expectation that a teacher can enhance interest in and attitude towards learning physics of secondary school students through cartoon integrated teaching. As part of the study, researcher introduced new teaching strategy ie; cartoon integrated teaching in order to stimulate affective domain along with cognitive domain. This strategy helps the researcher to establish the importance of cartoon integrated teaching for enhancing interest in and attitude towards learning physics of secondary school students. Cartoon integrated lesson plans can be included in the in-service training programmes for giving an idea about formulating cartoon integrated lesson plans help in developing interest in learning, attitude towards learning, achievement motivation etc., among secondary school students in learning various school subjects. Cartoon integrated activities can be integrated in text books which helps to stimulate the affective domain of the learners so as to improve their interest in and attitude towards learning physics which in turn will help in enhancing achievement. SCERT Kerala has introduced 'Samagra' portal along with IT@school with a view to provide teaching-learning resources to both teachers and students. Suitable cartoons can be uploaded to this portal so that the teachers can use than in classroom which will enhance the interest in and attitude towards learning different subjects.

## REFERENCES

- Ali and Awan. (2014). Attitude towards science and its relationship with Students' achievement in science. *Interdisciplinary Journal Of Contemporary Research In Business* 4(10), <https://journal-archievs28.webs.com/707-718.pdf>
- Akinbobola, A. O. (2009). Enhancing Students' Attitude towards Nigerian Senior Secondary School Physics through the Use of Cooperative, Competitive and Individualistic Learning Strategies. *Australian Journal of Teacher Education*.
- Alimen, R. A. (2009). Attitude Towards Physics and Physics Performance, Theories of Learning, and Prospects in Teaching Physics. *Liceo Journal of Higher Education Research*, 6(1), 301–320.
- Bindu, T.V. (2019). Academic hardiness and attitude towards learning of higher secondary school students, *Endeavours in Education, Vol 9 (1)*, ISSN 0976-4275.
- George, R. (2000). Measuring change in Students' Attitude toward Science over Time: An Application of Latent Variable Growth Modeling. *Journal of Science Education and Technology*, 9(3), 213–225. <https://doi.org/10.1023/A:1009491500456>
- Godwin Ballah Augustine and Okoronka. U. A. (2015). Attitude and academic performance of senior secondary school students in physics in Nigeria, [www.semanticscholar.org/paper](http://www.semanticscholar.org/paper) Corpus ID: 202118567
- Hadden, R.A. & Johnstone, A.H. (1983) Secondary school pupils' attitudes to science: the years of erosion, *European Journal of Science Education*.

- Heise, D.R. (1970). Semantic differential method, in: G.F. SUMNERS (Ed.) Attitude Measurement (Chicago, IL, Rand McNally).
- Hoffman, L., Lehrke, M. & Todt, E. (1985). Development and change in pupils' interests in physics (Grade 5–10): design a longitudinal study, in: Lehrke, M., Hoffman L.& Gardner P. (Eds) Interests in Science and Technology Education: conference proceedings.
- Kamba A. H., Giwa A. A., Libata I. A. and Wakkala G. T. (2018). The relationship between science process skills and student attitude toward physics in senior secondary school in Aliero metropolis, *African Educational Research Journal*, 6(3), pp 107-113, DOI: <https://doi.org/10.30918/AERJ.63.18.038>.
- Kaya, Hasan and Buyuk, Ugur.(2011). Attitudes Towards Physics Lessons and Physical Experiments of the High School Students. *European Journal of Physics Education* 2(1):38-49
- Koballa, T.R. (1988). The determinants of female junior high school students' intentions to enroll in elective physical sciences in high school: testing the applicability of the theory of reasoned action, *Journal of Research in Science Teaching*.
- Mccormick, D. (2000). Physics education, in: T.G. BRYCE & W.M. HUMES (Eds) Scottish Education, pp. 546–550 (Edinburgh, Edinburgh University Press). National Committee of Inquiry into Higher Education (1997) Dearing Report.
- Mekonnen, S. (2014). Problems Challenging the Academic Performance of Physics Students in Higher Governmental Institutions in the Case of Arbaminch, Wolayita Sodo, Hawassa and Dilla Universities. *Natural Science*, 6, 362–375. <https://doi.org/10.4236/ns.2014.65037>
- Schibeci, R. A. (1981). Science teachers and science-related attitudes. *European Journal of Science Education*, 3(4), 451–9. Google Scholar |
- Trumper, Ricardo. (2006). Factors Affecting Junior High School Students' Interest in Physics, *Journal of Science Education and Technology*, 15,47-58
- Veloo, A., Nor, R., & Khalid, R. (2015). Attitudes towards Physics and Additional Mathematics Achievement towards Physics Achievement. *International Education Series*, 8, 35-43. <https://doi.org/10.5539/ies.v8n3p35>
- Wilson, L. V., Ackerman, C., & Malave, C. (2000). Cross - Time Attitudes, Concept Formation, and Achievement in College Freshman Physics. *Journal of Research in Science Teaching*, 37(10), 1112–1120. [https://doi.org/10.1002/1098-2736\(200012\)37:](https://doi.org/10.1002/1098-2736(200012)37:1112)
- Xavier, Mushinzimana & Croix, Sinaruguliye, Jean de la. (2016). Attitude of physics students towards Physics at College of Science and Technology – University of Rwanda. *African Journals Online*, 3(2) eISSN: 2312-9239.