

# Transformation of Cognitive Level in Interfacing Automata theory and Grammar with Compiler Design and its Applications through Collaborative Teaching and Learning

M.Kameswari<sup>1</sup>, R.Suganya<sup>2</sup>  
Associate Professor<sup>1,2</sup>  
Department of Mathematics<sup>1</sup>  
Department of Information Technology<sup>2</sup>  
Thiagarajar College of Engineering, Madurai<sup>1,2</sup>  
[mkmat@tce.edu](mailto:mkmat@tce.edu) , [rsuganya@tce.edu](mailto:rsuganya@tce.edu)

## Abstract:

Collaborative research is very common, but collaborative teaching is very rare. Mathematics is the backbone of all engineering discipline. Conceptual teaching and learning of mathematics is highly required rather than doing computational teaching and learning of mathematics at engineering level. Mathematics is the essential ingredient for all cognitive levels. Teaching the course on automata and formal languages is challenging because of its theoretical nature. Even though mathematics teacher illustrates some applications of automata theory without interfacing with their discipline subjects, still vagueness in learning continues. Student's vision about the importance of conceptual learning of machines (Automata) for understanding compiler design along with the application is difficult. But explaining the application of automata theory through their discipline of subject, (Compiler design) and application ignites the student's higher order thinking. Thus collaborative teaching is carried out by mathematics and computer science teacher for better understanding of automata and grammar through their discipline subject called Compiler design. The paper discusses the experience of the mathematics and computer science teachers through collaborative teaching & learning and the results obtained. Feedback of this collaborative teaching from the students reveals that the transformation of their cognitive level from lower to higher order. It is inferred that, collaborative teaching is insisted in the 10:1 ratio of hours (Mathematics : Collaborative class) of topic concerned which results in removal of vagueness in understanding mathematics and also transforming the lower to higher order level. Thus, hybrid learning of Mathematics along with their discipline subjects ignites higher order thinking.

**Keywords:** Collaborative teaching, cognitive level, Automata Theory & Grammar, Compiler & Design, Applications.

## Background of this study:

Generally, students are lacking their interest in learning mathematics because of the awareness in appropriate interfacing with their major subjects along with its applications. Here in this work, Mathematics teacher is handling automata and grammar for Computer Science and Engineering (CSE) Students. CSE teacher is handling Compiler Design for CSE students. Often students started to blink what actually this machine means in Automata theory? Since there is no computation enjoyment and more theory is involved in automata, students feeling about vagueness in learning mathematics increases. So mathematics and computer science teacher combined together and planned for collaborative teaching in the class room.

Let us discuss it dramatically.

### **Role of teachers:**

**Mathematics teacher:** How Automata and grammar is interfaced with CSE discipline subject?

**CSE teacher:** Compiler Design is the CSE discipline subject interfacing automata and grammar and its plays a major role in the construction of compiler design.

**Mathematics teacher:** Can you explain the real time application of automata theory and grammar in the CSE Discipline.

**CSE teacher:** Yes, the application of grammar is directly helpful for the construction of compiler design. Eg : simple finite automata is used for digital circuits, switches etc., Push down automata is used in our day to-day applications like washing m/c, wet grinder, mixer grinder and ATM, Petrol refilling machine etc.

**Mathematics teacher:** What are the advancements & research carried out in this field?

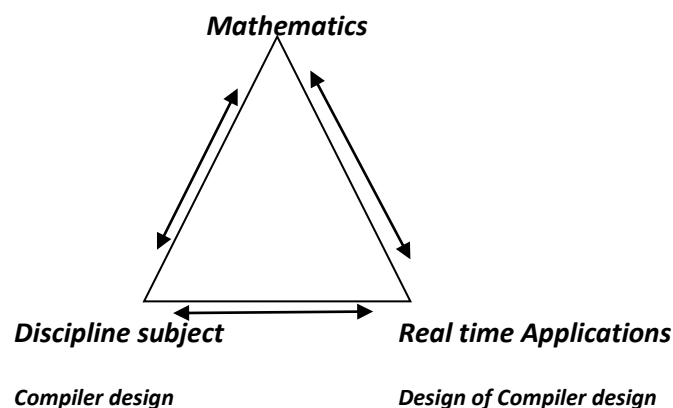
**CSE teacher:** Lot of research works are going on in the field of automata. Recent advancement: Timed automata and Cellular automata.

This reveals in the collaborative teaching of Mathematics and CSE discipline. An hour is completely engaged by the students of the Mathematics class where mathematics teacher is also present. Collaborative teaching is carried out. Evidence is presented below.

### **Proposed Methodology:**

The proposed work is explained in figure 1:

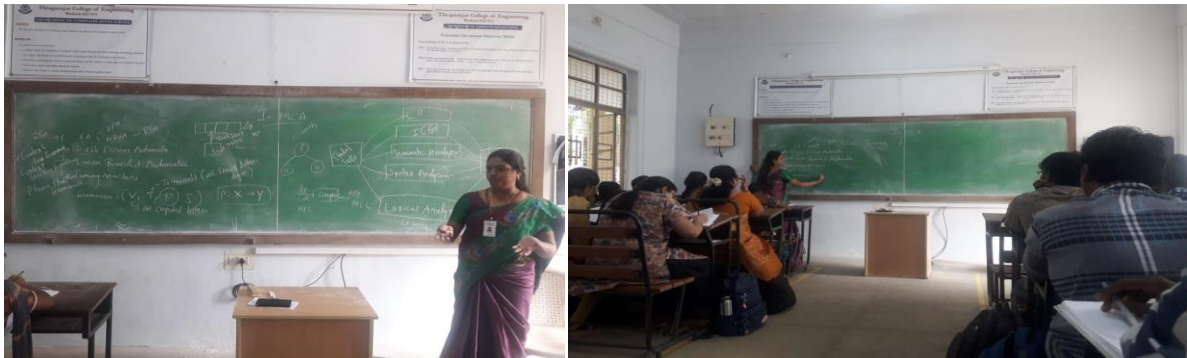
To take the students to higher order thinking, by interfacing Automata theory and Grammar with Compiler Design and its Applications through collaborative teaching and learning of mathematics and computer science teacher & students.



Through this collaborative teaching, conceptual understanding of mathematics subject in engineering studies can effectively be carried out. In this paper, it is observed from the feedback that transformation of higher order thinking has taken place with the students by interfacing Automata

theory and Grammar with Compiler Design and its Applications through collaborative teaching and learning of mathematics and computer science.

Sample photos taken during Collaborative Class are presented:



Collaborative research is very common, but collaborative teaching is very care.

Outcome of this practice:

1. Collaborative teaching is insisted for learning Mathematics by engineering students.
2. Collaborative teaching can be implemented in 10:1 ratio (Mathematic lecture hour : Collaborative teaching) would eradicate vagueness in learning mathematics
3. Collaborative teaching classroom promotes the students cognitive level as interested in doing projects in this area.
4. This collaborative teaching creates enthusiastic learning environment.

Sample Feedback received from the students after the collaborative class is presented:

