The Closing Bracket . . .

This column has typically featured teachers who have been innovative problem solvers. The introduction of the element of computational thinking in NEP 2020 has made several teachers begin to explore why and how computational thinking can improve their pedagogy, apart from the value addition to their students' thinking and problem-solving skills.

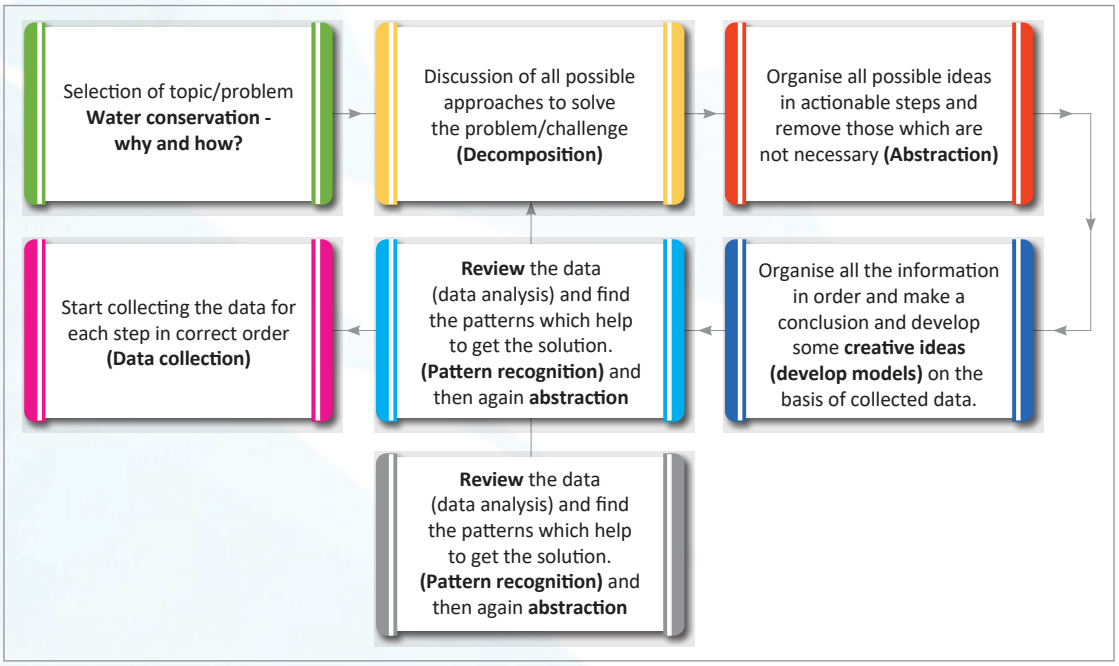
CSpathshala (https://cspathshala.org/) is an ACM India (Association for Computing Machinery India) initiative to bring a modern computing curriculum to Indian schools with 400,000 students learning CT (2/3rd from govt schools in rural areas). The CTiS (Computational Thinking in Schools https://india.hosting.acm.org/CTiS/) conference is an annual event organised by the CSpathshala community to provide a platform for teachers, educators and experts to share their best practices as well as challenges faced in implementing computational thinking in education. The 4th edition -CTiS 2022- will be held in Pune on 8th and 9th July. The conference has received 180+ abstracts from educators and teachers across the country and also from Singapore, Thailand and Brazil. The teacher accounts in this narrative are based on some of these abstracts. There are many pioneers in this effort both in India and abroad and clearly, teachers have risen to the challenge to push new frontiers and set new standards in pedagogy and student empowerment.

Sunita Maurya and Deepa Sharma are both teachers from the School of Scholars, Nagpur. Their abstract was based on the class project on the topic of "**Water Conservation: Why and How?**" based on the lesson Water- the precious resource of Std -VII.

In their own words, *we followed the cycle of **discussion, experimentation,** and **reviews** until we got the outcome. In every discussion, we discussed the outcomes followed by abstraction (to pick the necessary information from the collected data) and analysis of it, and again reworked.*

What is heartening was that the anticipated outcome was not the development of computational thinking. From their abstract- *In this project-based learning, our objective was to **sensitise** all the students about **water conservation by developing awareness about different sources of water, how people around the world are facing water crisis, and what we can do at the individual level.***

Clearly, they met their objective - *On an average, every student was able to save around **100 to 150 litres of water daily** and they concluded that if everyone saves a small amount of water then we can minimise*



Student Project: Water Conservation- Why and How?

the global issues of shortage of water. Look at this list drawn up by the students at the end of the project.

Suggestions- Where to minimise the use of water

1. Do not keep the tap on while brushing teeth or washing utensils.
2. Use a bucket and mug instead of a shower.
3. Minimise the use of washing machines.
4. Repair a leaking tap immediately.
5. Reuse the water wherever possible, such as: water used for mopping can be used for washing floors, drained water from water filters can be used for watering plants and other household work.

Suggestions for new models which help to save water

1. **Model-1** Use of plastic bottles for watering plants - we can hang one at some height and fix a drip tube near the roots or
2. **Model-2** Fix any bottle with holes in it into the soil and fill water in it for watering.
3. **Model-3** They also suggested developing some devices like a regulator in every tap and shower which will help to control the usage of water as per the need.

At the same time, these teachers were mindful of the value of computational thinking.

- *Students followed all the steps of the CT while doing this project. The CT approach improves the student's engagement in the learning process in very systematic ways.*
- *Activity 3 was actually time-consuming. And here we applied the CT skill to complete the project by decomposing the task into smaller tasks.*
- *We discussed and motivated the students to focus on patterns, such as how many times activities are repeated in a day, which container is used multiple times, and for what purpose. All these activities were very helpful in estimating the usage of water.*
- *With the help of algorithms learned in CT, they tried to write an algorithm on how to work on any project-based concepts.*

Clearly, computational thinking is intertwined with several disciplines, as other abstracts also showed. Teacher S. Sreedevi of Dr. B.R. Ambedkar Gurukulam, Palnadu, and teachers M Purna Bhavani and V Syamala Gowri of Dr. B.R. Ambedkar Gurukulam, Bapatla used the steps of computational thinking in student explorations of the Triangle Inequality theorem and in understanding the formula for the sum of the first n odd numbers, respectively. Both these schools come under the fold of APSWREIS (Andhra Pradesh Social Welfare Residential Educational Institutions Society) which serves students from severely disadvantaged backgrounds. On the other hand, teacher Sheetal Marwade (again from the School of Scholars) used CT to teach Sanskrit grammar and vocabulary, decomposing words phonetically and observing patterns in forming new words. A most interesting project on Quiet Time was carried out in Dr. Kalmadi Shama Rao High School in Pune by teachers Pallavi Naik and Pallavi Iyer. The problems of teaching and functioning in a noisy school was decomposed into factors over which they had no control (the school was in a busy traffic zone) and those over which they did (ambient noise). As students analysed patterns in both factors, they understood how they could work towards a quiet and peaceful environment. The school implemented a Quiet Time at the end of the working day- *One of the strongest takeaways from the implementation of quiet time was that the noise levels that were initially at 85-90 dB at the end of the day dramatically dropped to around 72-75 dB during the QT. One Std 9 student said that the Quiet time helped her to introspect about her day and think about ways to improve. She said that it helped her become more aware of what she was doing. A Std 6 student said that there is so much noise all day, that they look forward to the quiet time at the end of school and like to carry that feeling of peace home with them.*

Let's think about this!

Sneha Titus
Associate Editor