

# Technological Thinking: A Teaching Challenge

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## Abstract

*We present a 90 minute, experiential workshop. The central theme will be the challenge “How can technological thinking be taught without technology?” We believe that answering this question can play a critical role in education and in curriculum development. For instance, a clear idea of the attitudes and skills required for the successful use of technology allows technological thinking to be targeted in any class of a curriculum, and even with students who have not yet been exposed to technology in a significant way.*

*We will look at components of technological thinking through a series of activities, all of which themselves require no technology. Our goal with these activities will be to stimulate an understanding of the mind’s thinking processes and of the creative ways that ideas can be connected.*

*Participants will leave with new insights and theories for supporting technological thinking across a curriculum, irrespective of resource or funding constraints. In addition, participants will be encouraged to share and discuss particular problems they have encountered with technological thinking in education, which we will then consider in the light of the ideas presented during the workshop.*

## Introduction

Maybe you know of the anecdotal evidence of ice cream sales: increase peoples’ choice of flavours up to tens, even hundreds, and the most popular from among buckets of Japanese mochi, Tiramisu, even Turtle Soup are... vanilla, chocolate, and strawberry (or Neapolitan — a combination of all three).

Yet imagine a world in which vanilla, chocolate, and strawberry are the only flavours available. Someone has paid all businesses to keep every other formula secret (as Charles I supposedly paid his own ice-cream maker, to ensure the delicacy would remain a royal privilege). A small Ice Cream Elite can buy many flavours, but we cannot. In this world, our appreciation

for the forbidden tastes—and also for vanilla, chocolate and strawberry—is going to be different.

The analogy is over-simple, but consider the resemblance to technology. With so much available to so many, might we not be taking many of the possibilities for granted, and also not appreciating what we have? Neil Postman took the following position:

I don't think any of us can do much about the rapid growth of new technology. However, it is possible for us to learn how to control our own uses of technology. The "forum" that I think is best suited for this is our educational system. If students get a sound education in the history, social effects and psychological biases of technology, they may grow to be adults who use technology rather than be used by it. (Postman 1996)

This workshop is intended promote exactly such a forum for learning how to control our use of technology, within the education system. The reasons for taking the extreme position of "How can technological thinking be taught without technology?" are expanded in a full paper elsewhere in this proceedings. We call the approach *TNT* (the acronym stands for 'Technological Thinking, with No Technology' — the first 'T' is dropped to empahsise 'no technology').

For this workshop, our main message is that if significant aspects of technological thinking can be taught without direct recourse to technology, the options for reinforcing such thinking throughout a curriculum can be greatly increased.

## **Workshop Scope**

We should be clear that we are not intending to address low-level abilities, such as typing, using a mouse, or searching. Rather, our aim is to show how a concrete set of high-level skills related to technology can be taught and experienced, even with no direct use of technology itself. We give an initial version of a list of technological thinking skills in our full paper in this proceedings.

Who should come to the workshop? Anyone interested in thinking and technology in education. Also, those who would appreciate some concrete examples of how concepts related to technology can be taught without large financial outlay.

## **Workshop Philosophy**

We believe that technology-based education should be about synthesising and manipulating knowledge, skills and information. Through our experiences in Australia, Japan, and more recently, South Africa we have also

come to recognise the need for developing deeper cognitive and academic skills not only in respect to content, but within the cultures and contexts in which the content exists.

We have been developing a series of workshops (see [koto-tsukuri.org](http://koto-tsukuri.org)) that use the Japanese notion of *koto* to underpin a target of “interaction” between people and an environment with a philosophical understanding of how the world can be apprehended, rather than with any particular theory of learning. This enables our pedagogy to share aspects of numerous theoretical approaches.

As part of these workshops, we have experimented with how to create interactive experiences using just everyday materials. It was this process that led us to recognise that a breadth of subjects can be addressed in a *TNT* way; and that even technological thinking can be introduced to students with just the simplest of tools.

There are two contractions that relate well to the philosophy of the workshop: *much with little* and *bits to pieces*. The first is a reversal of the too-familiar experience of ‘technology for technology’s sake’, which often seems to create a ‘little with much’ (or, *littlemuch*) effect. The second is both a model for the overall *TNT* approach (use activities that exchange computer bits for tangible pieces of real life), and an exhortation to try (figuratively!) to smash up those keyboards for just a little while.

## Workshop Activities

Following the notion of *koto* introduced above, the workshop will be participatory, hands-on, and will focus on interaction. Since the learning experience in many of our activities derives from actually observing one’s own route to a ‘solution’, we avoid giving ‘spoilers’ here. Also, we will modify the workshop content and order to reflect the themes we encounter at the conference, and to link with content we experience in other talks.

Nevertheless, to give a flavour of what to expect, we can describe here some of the activities we are preparing:

- **TNT cards.** We are developing a deck of cards that describe important aspects of technological thinking. After each activity, we will either hand out appropriate cards, or let participants decide which card(s) they think are relevant to the activity. The set of cards themselves will represent a formalisation of technological thinking skills.
- **Life on Mars.** We will ask you to consider life on Mars from an unusual perspective.
- **Penny Drops.** Can you interact with the money in your pocket?
- **Desert Island.** What would you choose to take with you if marooned on a desert island. We will give you some hints.

- **My students use computer translation!** Or do they? We have adapted a colleague's research project as a workshop activity.
- **You cut me up.** How well did you understand the workshop message?
- **The koto board.** *TNT* is not a one-way linear process from facilitator-participant. We will use a *koto board* (itself an invention that came about through *TNT* thinking), to animate a discussion of technological thinking in education.

## Conclusions

This will be an unusual workshop, especially for an ICT conference. We hope to attract open-minded and forward-thinking participants, as well as those with an interest in collaboration. Participants should be aware that they may also be graded, but in an unusual way.

## References

Postman, N. (1996). *The End of Education: Redefining the Value of School*.  
<http://www.pbs.org/newshour/forum/january96/postman.1-17.html>