



TRIZ Takes Case-Based Instruction to a Higher Level

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Policy makers and educators assume that improvement in student learning and instruction requires a lengthy, slow, and detailed process. We need to challenge that assumption. The immediacy of recognizing and gathering information and making critical judgment calls induced by realistic problem scenarios can stimulate students to learn rapidly, efficiently, and effectively. And the additional benefit of the students' heightened sense of achievement brought about by richly-detailed 'rush of learning' experiences may be much more valuable than the content they learn.

Education settings are far removed from the applied situations in which the students will eventually use their learning. The disconnect between education and application has created both a technical and physical problem for instruction. In the technical sphere, educators have pared down the rich details of knowledge to achieve an abstract representation that is devoid of its context. The instructional abstraction results from both intention and inattention: information that has been stripped of its context is more generalizable and more easily subjected to analysis, but most instructors are also unfamiliar with direct use of the knowledge in application settings and, thus, are less likely to attend to critical details. In the physical sphere, students are often given their instruction in the sterile classroom environments but expected to transfer their training to real-world settings. Education gained greater control over learning by shifting the responsibility of transfer to the student, but application in real world settings has suffered due to the variable ability of students to transfer their training. Increasing demands brought about by technological advancements in applied settings have increased pressure on education and training programs to reduce the physical and technical disconnects between learning and doing.

The problems associated with severing learning from practice are readily apparent in medicine. Case-based teaching has been widely implemented in medical education to offset the dearth of general population case continuity in teaching hospitals that increasingly treat debilitated and end-stage geriatric patients. But case-based teaching has not reached its potential for activating the deep learning strategies and the attention to rapidly changing scenarios required in medical practice. Medical students and their instructors typically do not sense the immediacy of case processing in their case-based instruction. They use textbook reading strategies to acquire information from their case materials. In fact, medical students and faculty often negatively compare the quality of case materials to textbooks: they complain that the cases are poorly written, the information is presented in a variety of formats with various levels of detail, and the stapled photocopy reproduction. This was the situation when a medical school asked me to teach a clinical case due to a temporary shortage of physician instructors.

During my postdoctoral fellowship in child psychiatry, I had always looked forward to the 'rush of learning' that accompanies a strategic clinical workup, and wanted to

provide an analogous experience for my twenty first-year medical students. My goal was to 'Make Medicine Immediate' for the future physicians in my classroom. That the case materials were not professionally prepared added realism: patient medical charts are often similarly disorganized and difficult to read. Imperfect case materials were 'perfect' for my instructional objective.

Role playing is recommended to increase realism in case-based instruction but generally adds yet another layer of artificiality to a learning experience. Instructors assign roles, hand out scripts and 'character descriptions', and coach students on 'acting their part'. More time is spent in 'setting the scene' and pre-performance jitters than on learning. But a Fred Friendly role play of a social policy conflict with prominent national leaders, *Ethics in Journalism*, televised in 1988 changed my mind on role playing. Mr. Friendly, a colleague of Edward R Murrow and former president of CBS, was recently portrayed by George Clooney in *Good Night, and Good Luck*, a film about Senator McCarthy's hearings. Mr. Friendly's forte was an immersion in problem solving, his ability to draw participants into the reality of the problem, and a subtle humor. Mr. Friendly's method requires content expertise, preplanning of the objectives, and a structured effort to shape the students' responses toward the instructional objective. The key to the method is putting the students *into* a role, not asking them to play a role.

TRIZ APPLICATION Part 1 by Richard Langevin:

In order to make the teaching material easier to use, the teachers lost critical information or context of the application – a technical contradiction. By using Asymmetry as part of the solution concept, accelerating the recognition of data improved the performance of the students. In this brief teaching scenario, Dr. Currie recognizes that students were not being taught in a fast-paced, hospital environment, the real world context. The elements of the unknown, fast, life threatening decision making was left out of the academic arena of the classroom.

By one o'clock, my students had settled comfortably into their desks, and were catching up with their classmates on the latest goings-on. I handed out case copies, and announced that I would return "in a minute or two."

In the hall, I clocked two minutes listening to their social chatter, and re-entered the classroom.

"Please turn over the case materials." I requested.

Shock washed over my students' faces. "No," they pleaded, "we don't have a quiz today. It's a case!"

I replied, "It is a case. I asked that you turn the case materials over."

No one moved. "Over!" I said, moving toward them to add emphasis.

Disbelief and protest clearly conveyed in their body language and muttering, my students reluctantly turned their case papers face down on the desks. Moving from one to another to make sure that all of the case papers were now upside down, I began questioning: "What are the basic facts of this case?"

A student tried to peek at his case. "No looking. What are the basic facts of this case?"

Thus began a lengthy, uncomfortable silence.

"No one knows? Not a thing?"

Hesitantly, one student offered, "It's a man."

"Good!" I said warmly, "And?!"

Murmurs began. The students, still clearly dismayed by the way things were going with their new instructor, began to protest. "We need to read the case first," they pleaded, hoping I was misinformed about a basic teaching process.

"Ah, yes. Reading." I said, "That would have been an EXCELLENT idea . . . when you had the chance."

"When we had the chance?" they cried, "You just gave us the case a few minutes ago!"

We had arrived at my critical teaching point:

"Yes," I said, "You had TWO MINUTES when I was out in the hall. So. What are the basic facts of the case?"

They were now clearly baffled, but I had 100 percent of their attention.

"How many charts does a patient have?" I asked.

"Uhhhhhhmm . . . one?" offered a student.

"That's right. One!" I said. "And . . . I have it." I waved my case papers in the air. "How many minutes will you get to read a patients' chart when you are doing rounds in the hospital?"

"Oh, no." groaned one student, beginning to catch on. "Probably two minutes."

"No." said another student, with increasing confidence, "We're the medical students, we'll be lucky to have half a minute with the chart, if that!"

Reality began to surface. Their faces registered shock.

"So," I said, quite a bit more gently, "What are the basic facts of the case?"

"Hmmm, he was middle aged . . . ?" murmured one student, in a quiet, desperate tone.

"Yeh, he was 57 – I saw that," said another.

Another student: "He was a farmer . . . "

And another: "He had chest pains . . . upper left shoulder radiating into his neck. But I stopped reading after that."

"Upper left chest pain, sharp at times. And he was anxious!" exclaimed another. The entire class swiveled to look at her, leading to my impression that she rarely spoke in class.

"His family was there? His wife, a daughter and a . . . son in-law? Was that it? Three people – I think it was a son-in-law, not a son, because the farmer was worried that no one could take care of his cows." In fact, some students had read parts of the case but they had established a norm to not share information.

As they began to piece together their fragments of case information, I started giving the 'patient chart' to one student after another for brief moments. They

gamely devoured as much information as they could in their few seconds with 'the chart' and reported pertinent information to the class.

Moving through the case material quickly, we formed a work-up plan, and helped the family make-decisions about how to ensure that the cows would be milked on schedule while the farmer remained with us for tests and further examination.

My students left at the end of the hour, lively and excited. Several said, eyes glowing, "This is why I wanted to become a physician!" They loved the rush of fast learning just as much as I did.

Several months later, one of the medical school instructors met with me to discuss medical education issues. She said the admissions decisions were far better for this class compared to previous classes. "What makes you say that?" I asked. She said the entire class of eighty students treated the case-based teaching materials as if they were patient charts, that they gleaned pertinent information immediately, and rapidly produced summary of "the basic facts of the case." She said that it was impressive how fast they learn the case material – that, in the previous years, the faculty spent the entire hour going over case materials, but the current class accurately summarized the case information in the first few minutes of a class session. Consequently, the instructors now had plenty of time to discuss the work up the case, and to help the students develop detailed clinical knowledge.

I told her about my intervention to 'Make Medicine Immediate' with one of the case groups. She said, "That's it! And your students taught the other students about their experience. They want us to see how professional they are in finding and organizing the case information. SOMETHING had changed; we just did not know what. Wow! You improved the behavior of an entire medical school class in one hour."

"Actually," I said, "in twelve minutes."

TRIZ APPLICATION Part 2 by Richard Langevin:

Dr. Currie moved the learning experience from the system level of the classroom to the supersystem level of the virtual hospital. By doing that she was able to intensify the case study, and collapse timeframes for gathering data, assimilating information and developing solutions for patient care and treatment. She eliminated the lackadaisical attitude of the students and enhanced learning.

The primary function of the simulation of working case studies was elevated to the next level. This creates a more energetic and potent learning opportunity for the students.

The problem is solved. The students are learning more and are more excited about being doctors. The students are now more confident that they will be successful. Building confidence is an important function of the instructor. It is important to convey clearly the information that the students should learn but if they lack the confidence to apply what they are learning, they will be knowledgeable but incompetent doctors.

This TRIZ case-based technique can be applied to science, technical and business teaching and training to "Make the Mission Immediate". Please let us know if you try the technique, and what outcomes you obtain. We would be delighted to hear your feedback. Send feedback and questions to: CurrieTRIZ@gmail.com.