



Sometimes you just need a rest from thinking.

KNOWLEDGE AND CRITICAL THINKING

I have been thinking for some time about the important link between knowledge and critical thinking and the difficulties a 12 year old has with gaining high quality knowledge, with which to think critically, when their research skills are only beginning to develop. I have been keeping in mind this quote by Robert Ennis, 'but ultimately, of course, familiarity with the subject and situation calling for critical thinking is essential for critical thinking.'

Robert Ennis is, "the father of the critical thinking movement". His article, "A Concept of Critical Thinking", published in 1962, made everyone in education aware of the need to teach students critical thinking and explained exactly what we had to teach if we were to do so. (Swartz 2010)

To start the discussion I have asked Bob Swartz to write a piece for this issue looking at the importance of high quality knowledge and critical thinking. We can use this to think about how it impacts on our inquiry programmes. EDITOR

A CRITICAL THINKER'S CHALLENGE

Robert J. Swartz

Disaster

In June of 1995 the roof of a five-storey department store, the Sampoong Department Store, in Seoul, Korea, collapsed, falling through all five floors in less than 20 seconds and killing over 500 shoppers and employees. Within a week the authorities had ascertained what caused the roof to collapse: an air conditioning unit weighing half again as much as the specifications for weight on the roof had fallen through the roof. The equipment manager of the department store, who had escaped injury in the accident (he was out of the store having coffee at a nearby coffee shop when the accident occurred), was arrested and charged with negligent homicide.

What Caused It and Who is Responsible?

It was not initially clear to the investigators that the weight of the air conditioning unit was responsible for the accident when they started their inquiry. They thought that it could be that something fell on the roof (a meteorite, some space debris, a plane crash), it could have been a gas explosion, it could have been an act of domestic terrorism, it could have been something too heavy on the roof, or it could have been a bad foundation. When they checked with the airport they found no planes missing, nor was there wreckage at the site, and witnesses said that they saw nothing fall on the roof. But in reviewing tapes taken from cameras on the upper floors of the building they found that cracks began to appear in the upper walls over the preceding two months and, daily, they seemed to be spreading, while prior to April there were no cracks. When they probed further they found that the date that the cracks began was just a few days after some new construction on the fourth and fifth floors. Then they found that the specs of the air conditioning unit revealed that it was heavier than the building specs allowed, given the way the building was constructed. While not proof, they took this evidence to be pretty strong evidence that the weight of the air conditioning unit on the roof was the cause of the collapse. Further investigation revealed that the horizontal roof supports under the unit on the collapsed roof were twisted while the girders that were not directly under the unit were not. This is when they ordered the arrest of the equipment manager.

This all seems perfectly straightforward. A tragic accident occurred. No one knew initially what caused it. There was some speculation, but no one jumped to any conclusions. People recognized the need for an investigation and for some careful thinking about what the investigation revealed before they could determine the cause, and then, whether anyone should be held responsible. This, in fact, seems to be a paradigm of critical thinking: you should suspend your judgment until you can get information upon which you can base a firm judgment about what the cause of the accident was and whether anyone was to blame. They did exactly that: critical thinking at its best.

Critical Thinking as a Route to Knowledge

Let's stop here for a moment and think about this. First, it should be clear that the investigators thought that they had correctly ascertained some things that weren't known at the time of the accident: what caused the accident, and who was to blame. And, indeed, it does seem that they did acquire new knowledge. But how? Well, this new knowledge was also based on some new things that they learned that they did not know at the time of the accident: the cracks, for example. In fact, it seems that they also discovered much more, and with each revelation the cause became clearer to them: that there was overweight equipment on the roof, something that they also did



THE SKILFUL THINKER

Teachers of Thinking - Aotearoa Collaborative

not know at the time of the accident: how heavy the equipment was compared to the specifications for weight load on the roof. And they also exhibited some good skill at thinking – they knew that they did not know enough initially to judge what the cause was, but as they gathered information they recognized some as evidence in favor of one of the possibilities they had initially advanced, but not sufficient to judge that this possibility – the excessive weight of something on the roof – was the cause, until they gathered additional information that they identified also as evidence in favor of this possibility, evidence that they then thought was sufficient to make this judgment. So they acquired a lot of new knowledge, like most investigations do, and they used their skill at critical thinking to lead them to no longer suspend their judgment about the cause of the disaster but to now come down in favor of one explanation – the excessive weight of the equipment on the roof caused the collapse.

Teaching Our Students to Become Critical Thinkers

Ok – so what does this tell us about teaching critical thinking? Well, clearly there is a procedure that these investigators went through here. They developed and considered possible causes, making sure that they kept open minds and did not jump to any conclusions at this stage, then they looked for information relevant to these possibilities (that's why they looked to see if there were any cracks in the upper walls). Then, when they got relevant information, they had to make note of it and judge how strongly the information supported the possibilities (or the specific possibility that they were focusing their attention on), not endorsing a particular possibility like the excessive weight of the equipment on the roof until they judged that the evidence they had was strong enough. So – challenge students with problem situations in which something happens and the cause is unknown, teach them this strategy explicitly, and guide them through its use in determining the cause. It is best, of course, to do this in some rich curricular context, like the study of why some major historical event occurred, or why some character in literature bring studied behaved as he or she did. At the same time stress the attitudes and behaviors implicit in not jumping to conclusions and persisting until you get enough evidence about these causes. Then give the students plenty of additional practice in similar challenges until they develop the habit of asking and answering these questions as they investigate, and not endorsing something as a cause until there is sufficient evidence. Sounds like a good instructional model.

But there's more to this than meets the eye and we need to be cautions in adopting this model in general to help students develop the requisite skill in exercising critical thinking in cases like this. Let's look deeper.

Lessons to be Learned: Successful Critical Thinking Requires Critical Thinking From the Beginning.

First, let us note that good investigative procedure requires that any information that is gathered and that might be used to rule in or out some of the possible causes be certified as reliable. Hearsay is usually not taken seriously, whereas eyewitnesses are if corroborated independently. In this case there were dozens of eyewitnesses outside the building and they all said that they saw nothing fall on the roof. So it seems that before the investigators can say that they have actual evidence for or against some possibility it needs to be certified as reliable. This means that if there is new information gathered – new knowledge acquired – in the investigation it should, itself, be based on appropriate and careful critical thinking about its sources.

We can build this into our classroom practice, of course – by adding a sub-structure to the acquisition of information that can serve as evidence for or against the possible causes the students are considering. We can teach students how to judge the reliability of sources and insist that they use this skill of critical thinking also as they investigate causes. Or we can control the sources that the students are working from and give them only sources of information from which they gather evidence that we judge to be reliable. But let us note that the latter is viable only if we also do give students, in addition to practice at the critical thinking skill of determining causes, instruction and practice that leads to their developing skill at judging the reliability of sources themselves, and we make note that we are presupposing this based on the teacher's judgment in this case of causal explanation. Then, of course, if any student challenges us about this (which we should welcome) we should be prepared to explain why we think the sources we have chosen are reliable. And we should be willing to back down on this if any of our students produce better reasons for thinking that our sources are biased or otherwise unreliable. We, even as teachers, are still not free from the pitfalls of unwise judgments.



Lessons to be Learned: Successful Critical Thinking Draws from What We Already Know Too.

But let's look even deeper. How did the investigators come up with their list of possible causes? And how did they know what to look for to try to find evidence for or against these? This episode of critical thinking, like every such episode, is built on a foundation of knowledge and accepted beliefs that are usually based on previous experience and previous learning, and remain largely submerged in the recesses of our minds along with a huge web of other beliefs and knowledge that we accumulate as we live our lives,

starting with our earliest years, and never ending until we pass on. Included in this web is knowledge about the kinds of things that can cause roofs to collapse, perhaps based on past experience of such incidents, together with accumulated knowledge about what sorts of things, like cracks in ceilings, are indicators of added stress. It is calling up such information from this reservoir that provides the connections on the basis of which we develop, through our critical thinking, new insights like those into the cause of the Sampoong disaster. Without this reservoir we may have skill at thinking critically about causes, but it will not engage, or at least not engage well, in situations like the one we have been describing. With it, our recognition of the need to find a cause in a situation like this will trigger accessing this reservoir to uncover any relevant background knowledge that we have. This is what engages our thinking when we do causal explanation with rich substantive possible causes, rich substantive possible evidence, and, ultimately, rich substantive conclusions based on the actual evidence.

Back in the Classroom

So what does this tell us about teaching critical thinking? Something that may seem obvious, but is not trivial. It is that we need to make sure, as we give students critical thinking challenges and teach or students strategies for meeting these challenges, that there is that base of background knowledge and belief in the stock of what our students have already learned, to support these activities. High school students in Biology may be able to grapple well with the question of the cause of the extinction of the dinosaurs. Second grade students will not. This does not mean that just before we challenge students with a causal explanation puzzle we need to cram relevant background knowledge into their heads. That, in a way, defeats the purpose. Rather, we need to make sure that the level of general knowledge we expect our students to have obtained contains relevant background information, and that they are in a class in which gaps in such background knowledge can be filled by class interaction. This is because part of what we want to give students practice in, so that it becomes something they do as a matter of course, is to get in the habit of accessing relevant background information from those mysterious depths of the mind in which they reside, when they face such challenges.

How can we do that? Well, one technique is to face this challenge directly. We might have asked, for example, in the case of the Sampoong disaster, “What do we know about what sorts of things might make the roof of a building collapse?” and explicitly derive our list of possible causes from answers to this question. It is well worth thinking about other ways of helping our students develop the habit of probing that reservoir of information they have accumulated for relevant ideas.

Lessons to be Learned: Successful Critical Thinking Requires That We Keep an Open Mind

But let me end these comments with another challenge, this time to us. It grows out of the way this story about

the Sampoong collapse ended. The equipment manager who was arrested was quickly released and all charges dropped. Why? Because further investigation revealed that when the building was constructed the construction company that built it changed the plans and cut back both the number and size of the vertical support columns provided on the upper floors in order to make room for an escalator, and to save money, under orders from the owner of the building, Lee Joon, and his son. This decreased the maximum load that could be supported on the roof and reduced the load bearing capability of the support columns to the point where some of them actually poked through the ceiling like spikes rather than supported it. But they never changed the figures indicating the new maximum load in the building specifications. So the equipment manager, who consulted these specs before authorizing new construction, had every reason to believe that the roof would continue to support the weight of the air conditioning equipment. It was not just the weight of the air conditioner, but the air conditioner, plus the inadequate support for the roof, that caused the collapse.

There are two important points here. One is that to say that the weight of the air conditioner was the cause may stop us from looking further. In this case there was more than one cause. And this is important because it leads us to making a more accurate judgment of who should be held responsible for the disaster (if anyone). Clearly, the equipment manager’s approval of the air conditioner played a causal role in the disaster. But this is not enough to hold him morally and legally responsible for the disaster. The owner contributed causally also. But in his case he was both morally and legally responsible. These judgments seem to involve well-founded exercise of critical thinking as well. What is the difference? When is a person who contributes to an event morally responsible for it – to blame for it if it is something morally unacceptable, or deplorable, as in this case? And when is somebody not? What do you think?

And by the way, while Lee Joon was arrested, found guilty, and sent to prison, his son could not be found when the authorities sought to arrest him also. There is speculation that he is now living and working in Mongolia. What critical judgment should we make about his character? Why?

DO YOU KNOW OF A COLLEAGUE DOING INTERESTING THINGS WITH THEIR CLASS?

Please email Richard at rcote@bis.school.nz so we can ask if they could be featured in a future issue of ‘The Skilful Thinker.’

JOINING THE COLLABORATIVE

Membership of the ‘Teachers of Skilful Thinking, Aotearoa Collaborative’ is simple, all you need to do is email:

Richard at: rcote@bis.school.nz



NEW THINKING-BASED LEARNING BOOK

We have produced a 53 page teachers' guide that explains our school's efforts to develop a thinking curriculum where students actively acquire knowledge that leads them to develop new insights and understandings that move them beyond their own personal experiences, providing reliable explanations or new ways of looking at the world. They do this by developing habits of skilful thinking that they can apply in many other appropriate contexts. These include skills such as analysing parts-whole relationships, generating creative ways to solve problems, and skills of critical thinking like judging the reliability of sources and using evidence to the likelihood of predictions and causal explanations. These are all structured into extended units we call Quests - quests for new insights and understandings as our students try to solve engaging problems.

CONTENTS

Thinking-Based Learning	4
New Insights and Understandings	5
Infusing Skilful Thinking	6
Our Thinking Curriculum	7
How Our Thinking Developed	8
Origins of Our Approach	11
What is a Quest?	12
Available Quests	13
Creating a Quest	16
Scenarios as Fertile Places	17
Writing a Scenario	18
Scenarios and the Fertility Test	19
Teachers' Guide and Resource CD	20
Unit Plan	21
Unit Planning Guide	22
Using a Quest	23
What Does it Look Like in Action?	24
Becoming an Independent Learner	25
The Role of the Teacher	26
Quest Stages	27
Time Allocation - Major Quest	29
Time Allocation - Minor Quest	30
Time Allocation - Technology Quest	31
Setting the Scene	32
Quests and Collaborative Pairs	33
Learning Conversations	35
Three Level Guide	37
Convincing Arguments	39
Integrating the Thinking Skill into an Argument	40
Concluding Performances	41
Concluding Conversation	42
Assessment	43
Research	44
Student Voice	45
Teacher Voice	46
Parent Voice	47
Quests and the Key Competences	48
Information Literacy Skills Matrix	50
Quests and Computer Pods	51
Further Reading	52
Awards and Presentations	53

Developing a Thinking Curriculum

Thinking-Based Learning - A Quest for New Insights and Understandings



A copy of this book is available as a pdf on www.bis.school.nz click on the Thinking-Based Learning button and scroll down.

© Birkdale Intermediate School

Permission is given to individual schools to use this material for non-commercial use in their own professional development programmes.

