

Article for Module 3

The Growing Importance of Critical Thinking in IT Education

The Growing Importance of Critical Thinking in IT Education

Author: Arosha K. Bandara. **Source:** Taken from [ComputerWeekly](#).

April 15, 2015

A criticism often levelled at IT education is that by the time you come to apply the skills, they might be out of date. Why learn technology skills when that technology might not be in use in a couple of years?

IT does change fast, but the fundamentals of how we design and build systems change at a slower pace. As long as we learn about today's technology in the context of how it relates to the business world and how it is likely to evolve, then we will be in a much better position to respond intelligently to the changing world.

But this is often overlooked by both formal and in-house training programmes, which have favoured skills which address very specific challenges. In order to be adequately prepared to tackle tomorrow's technology challenges, we need to move from a mindset of knowing how to apply technology to well understood situations, to one of being able to think critically about problems, and identify solutions to unknown as well as familiar technology issues.

Think differently

To prepare IT professionals for the rapidly changing world of technology, we need to instil an approach based on critical thinking. I'll look at how we might do this, before putting this approach in context.

The organisation you work in is complex. It is shaped by the nature of individual thinking processes as well as existing technology and business pressures. Any changes will have causes and consequences that may have a much wider impact. Solving a problem will change things, which could lead to other problems.

Different people see different priorities. There is sometimes no obvious answer, or many different reasonable answers. But there are also wrong answers, which can be pursued, sometimes at great cost. These often result from a very narrow focus on the problem out of context.

Interconnections are too often ignored, a single cause may be presumed, or an individual quickly blamed. This is not exclusive to IT, we see this in wider society all the time – it's easier to blame crime on individual criminals than deal with the many complex societal factors that lead some to criminality. The other mistake is a focus

on outcomes – i.e. how many criminals can we arrest rather than how many crimes can we prevent.

To avoid these mistakes, problems should be approached by thinking about the systems that affect the challenge or opportunity. This is more difficult than isolating and addressing a problem, but ultimately more likely to produce a better solution.

Thinking about systems

As well as looking at how technology works, it is necessary to think about how people will react to it. Is a great new technology too hard to learn? Will tough new security procedures incentivise people to circumvent them? We need to understand the systems in which new technology operates.

Cognitive mapping is a technique for understanding and shaping the mental models your stakeholders use to perceive, contextualise, simplify, and make sense of otherwise complex problems. Thinking through these will help ensure new technologies and programmes have the results they are supposed to.

However good your plan is, you won't foresee everything, so it is also critical to continuously test and review, and feed that learning into your ever evolving plans. Throughout the life cycle of any project, topics such as stakeholders, finance, risk, people, project administration and quality must be constantly reviewed in the context of the project.

The world of the future will require more understanding of flexible management. We will have to place more emphasis on learning as we go and making sure that learning changes our practice and organisations. We need to get used to this.

Critical thinking in context

Software engineering as one of the core skills of any modern IT professional relates to complex real world challenges.

Contact between the business and the external world is often mediated by software, and the business has a responsibility to its wider community that may be served, or jeopardised, by this software.

Skilled software engineers can add a lot of value by creating or adapting software, from managing projects and sales, analysing performance and customer data, and automating tasks. All of these exist in a complex real world, where humans react to change in different ways. Any new system must understand how users or customers will respond to it.

The skill is not one of knowing how to do this, it is one of knowing how to model the relationships between the software, the organisation it serves, and its wider environment. This approach must be used in development, roll out, updates and maintenance – it is an evolving process.

Critical thinking doesn't mean ignoring technology, of course. The process can be evolved further by an understanding of different software engineering tools that can help them simulate, manage and monitor. Using these effectively is part of the skill of good IT planning.

A critical approach allows you to plan effectively

IT is critical to business and will become ever more so. It exists in an increasingly networked and interconnected world, where groups, teams, organisations and even nations will have to be smarter in their ways of working together.

IT professionals therefore need to be able to think in ways that reflect these challenges. IT education at all levels must teach how to take a critical approach which relates technical competencies to complex technological, human and business issues.

Dr Bandara teaches Postgraduate Computing courses at The Open University aimed at helping IT professionals advance by using technology strategically to drive the business forward.