

Developing the Courage to Be Incompetent

Dr Carol J Steiner
 Faculty of Informatics and Communication
 Central Queensland University
 Mackay, Queensland, Australia
 c.steiner@cqu.edu.au

Scholarly Inquiry in Science Teaching and Learning
 UniServe Symposium
 Sydney, Australia
 1 October 2004

Structure of this presentation

- * What are the needs of industry?
 - * Results from qualitative research
- * Why is it difficult to meet the needs of industry in science education?
 - * Kuhn (1970) *Structure of Scientific Revolutions*
 - * Heidegger (1938) "The Age of the World Picture"
- * How might science education meet the needs of industry?

Methodology

- * Philosophical, qualitative
- * Invetech, Melbourne
 - * R&D consultancy producing market-ready innovations
 - * Employs 90 engineers, physicists, chemists, technologists, industrial designers
- * Depth interviews (2-6 hours)
- * Ten directors and group business managers

Skills and qualities of innovators

- * Communication skills
 - * Get along with teams, clients, clients' staff
- * Listening, empathy (anticipate client needs)
- * Open minded, accept other's ideas
 - * I'm the expert
 - * I've nothing to learn
 - * What do you know about...?!
- * Energetic, enthusiastic self-starters, high achievers
- * Thrive on change, diversity and challenge
- * Confidence, drive, ability to make things happen
- * Wide vision, wide interests, not tunnel vision
- * They must be "sparkly people"

Sound like your graduates?

Attitudes of innovators

- * Team-oriented: no individualists, prima donnas, stars, centres of the universe, glory hogs
- * Challenge-seeking attitude
- * Open-Minded
 - * "interested in commercial factors, not just content to play transistors in the back room."
 - * "interested in what's going on, be ready to contribute, mix."
 - * "They must want to learn and not imagine that they know everything"

Are your graduates like this?

Why is it hard to meet industry needs?

- * Competence in a discipline community is determined by the processes and values of its paradigm.
- * To be accepted as **competent** by a discipline community, you **must** accept its paradigm's rules, vision & values.
- * Paradigms create **incommensurate** different worlds.
- * The paradigm worlds of science are incommensurate with the paradigm worlds of industry.
- * Scientists can't be competent in their worlds **AND** display the incommensurate skills, qualities and attitudes valued in the worlds of industry.
- * Scientists must **become incompetent** in their worlds to meet the needs of industry.

How to be incompetent

- * If **competence** relies on **conformity** with **paradigm prescriptions**, then to be **incompetent**, scientists must **refuse to conform to its paradigm rules** sometimes.
 - * Think beyond the borders of one's discipline
Wide vision and interests, open minded, no tunnel vision, no playing transistors in the back room, value diversity
 - * Relate to outsiders cooperatively, respectfully
Team oriented, value outside perspectives, no self-proclaimed experts, no prima donnas, no glory hogs
 - * Be sparkly people
Challenge seeking attitude, high achievers

What is incompetence?

- * Not sloppy, lazy, careless or unskilled work
- * Intentional, thoughtful, occasional violation of paradigm prescriptions
- * Manifestation of authenticity/individuality
 - Being yourself (existentially)
 - Rejecting your paradigm identity as a physicist, chemist, engineer, analyst, programmer, academic
 - Momentarily embracing your individuality

Why authenticity?

- * Heidegger: How we see ourselves determines our possibilities, how we can act
 - Your child wants to go to the park
 - Who are you?
 - Good parent?
 - Busy researcher?
 - Couch potato?
- * Kuhn: Paradigms limit possibilities for creativity and innovation
 - Your manager wants your results
 - Who are you?
 - I need to repeat this twice more to be sure.
 - Results are reliable enough to go to the next stage.
 - With a little tweak, we could get this to do X!

Authenticity requires

- * Mineness: I have my own unique possibilities, not just the limited possibilities of my paradigm identity
- * Resoluteness: I don't have to conform to paradigm practice, values or vision; I can choose from among my own possibilities, make up my own mind
- * A situation: A problem that defies paradigmatic practices, solutions or values
 - Routine problems: paradigm solutions on auto pilot (normal science)
 - Commercial pressures (time, money, outcomes): extra-paradigm solutions (incompetence)
 - Any action requiring a conscious decision is **an opportunity for authenticity a chance to be incompetent**

Why does incompetence take courage?

- * Kuhn: science **enforces** paradigm prescriptions
"Some physicists do not want to recognise anything different as 'proper' physics. If someone moves outside their narrow definition of physics, he or she has simply 'left physics,' and anyone thus diverted is rarely invited back." (Wolf)
- * Heidegger: science demands 'binding adherence to the rule and law of science.'
- * The rigor of 'proper' science is **too expensive** and **too slow** for the paradigm world of industry
- * Scientists can pay for meeting the needs of industry with their reputations and credibility in their paradigm world

Developing the courage to be incompetent

- * Undermine graduates' commitment to their paradigm
 - Just before they leave university
 - Too early or too often, they'll never be competent
- * Prepare students to **decide** when to be good scientists and when to break the paradigm rules
 - Reflect on and debate beliefs, practices and values
 - Acknowledge historical, situational nature of scientific knowledge
 - Explore limits of scientific knowledge
 - Expose students to other paradigms (business, social, communication, consumption, finance, ethical)
 - Expose students to innovators and innovation policy
 - Outline the dangers and rewards of breaking the rules

Encourage reflective practice rather than blind rigor

