Promoting Creativity – cultivating the research mindset

What is Creativity in Research?

Kevin Byron
What is Creativity in Research?

• Defining Creativity

• How Research Progresses

• Creativity Tools and Techniques
What is Creativity?

Ideas that are **original** and **useful**. A novel and appropriate response to an open-ended challenge or problem.

- Imagination
- Intuition
- Ingenuity
- Insight
- Inspiration

Research Student Regulations and Handbook:

“To be admitted to the degree of Doctor of Philosophy a candidate shall have presented a thesis on the advanced study and research which has satisfied the examiners and **contains original work**, and **contains material which is deemed worthy of publication**, and …………….”
‘C’ and ‘c’ Creativity!
How Research Progresses

Progress

Effort (Time)

Next Development

Maturity

Competing theories

Infancy

Rapid Development

Creative Steps

Delays

Setbacks
Challenges in Developing a Climate of Creativity and Innovation

“We must no longer wait for tomorrow - it has to be invented” - Gaston Berger

“Tomorrow is not what it used to be!” - Paul Valery

- Nurture a Creative and Entrepreneurial Mindset
- Reduce Delays: (1) Incubation (Creativity) (2) Research & Enterprise Management (Innovation Process)
Insight Delay 1: *The End Gain*
Insight Delay 2: The child in the crowd!

"Why didn’t I think of that?"
Insight Delay 3: Realising the potential of new discoveries

The Discovery of Buckminsterfullerene (Buckyballs)
Thinking Styles

Divergent Thinking       Convergent Thinking
Osborn–Parnes Creative Problem Solving (CPS)

1. Objective Finding
2. Fact Finding
3. Problem Finding
4. Idea Finding
5. Solution Finding
6. Acceptance Finding

Steps | Stages
---|---
1 - 3 | Identifying and Clarifying the Challenge
4 - 5 | Finding Ideas and Evaluating them
6 | Putting the Solutions into Action
Idea Finding – Transformation

Creativity?

“The transformation of conceptual spaces” (Boden)
Transformation

• Ask "What if?"

Substitute
Combine
Adapt
Modify
(Magnify/Minify/Multiply)
Put to other uses
Eliminate
Reverse
### SCAMPER prompts

**SUBSTITUTE**
- What can be substituted?
- Who else?
- Can the rules be changed?
- Other Ingredients, Material?
- Other processes or procedures?
- Other Place?
- Other Approach? What else instead?

**COMBINE**
- What ideas can be combined?
- What about combining units or departments?
- What materials can be combined?
- What methods could be combined?
- What tasks can be combined?
- What procedures could be combined?
- What functions could be combined?
- What could be included with this idea?
- What about a blend, mixture or assortment?

**MODIFY**
- What if I change the colour, shape, form, scent, sound, movement?
- What if I scale up the idea/object?
- What if I scale down the idea/object?
- What if I multiply it?
- What changes can I make further up/down the system?

**ADAPT**
- What else is like this?
- What other ideas does this suggest?
- Does the past offer a parallel?
- How do I adapt it for a different customer?
- How do I adapt it to a different market?
- What could be copied?
- Whom could I emulate?
- What else could be adapted?
- What different contexts can I put my concept in?
- What ideas outside my field could I incorporate?

**PUT TO OTHER USES**
- What else can this be used for?
- What else could be done with this?

**ELIMINATE**
- What should I omit?
- Should I divide it?
- Should I separate it?
- Streamline? Miniaturise?
- Subtract? Delete? Remove?
- What’s unnecessary?

**REVERSE**
- What if I turn it inside out?
- What if I do the opposite?
- What if I reverse roles?
- What if I work backwards?
- What are the negatives?
“Chance Favours ‘The Prepared Mind’”

Louis Pasteur

New ideas arise through asking the right questions and adopting a creative attitude. The right question arises through asking many questions and this process can be assisted with the appropriate use of technology.
Improvements in the development of the three ‘master’ skills of creativity, critical thinking and influence are essential for developing the next generation of researchers. Their future careers are set against a backdrop of economic turbulence, an increasing demand for capabilities in these skills in the private sector, a growing requirement to demonstrate impact beyond publications with their research and a career trajectory that is unpredictable and short-term.