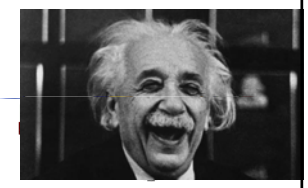
Creativity: Born or Bred?

IBSC Conference 2012

Meg Adem



Albert Einstein

"It is the supreme art of the teacher to awaken joy in creative expression and knowledge"

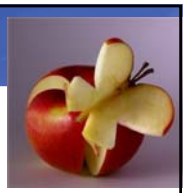
Today:

- What is creativity?
- Nature vs nurture debate
- (Talent vs environment & practise)
- THEORY
  Carol Dweck: growth mindset vs fixed mindset
- BRAIN RESEARCH
  what is happening in our brain when we are creative?
- Making up your own mind
- What should we then be doing in the classroom?

What is creativity?

- Google gives 191 million hits for this very question
- how do <u>you</u> identify a creative student?
- Dictionary definition:
- *The use of the imagination or original ideas, esp. in the production of an artistic work*

Humans are motivated to be creative



- Creativity is :
- *the tendency to generate or recognise ideas, alternatives, or possibilities that may be useful in*
- 1. solving problems,
- 2. communicating with others,
- 3. and entertaining ourselves and others

Definition taken from Robert Franken (Human Motivation, 3rd Edition)

Nature vs Nurture

- Is creativity then born?
- Or is it bred? (environment & practise)
- Before we continue – what is your standpoint?

CREATIVITY CAN BE BRED

(Nurture, environment & practise)

Carol Dweck

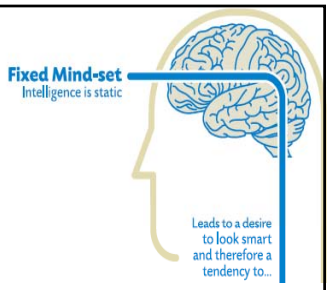
- Professor of Psychology at Stanford University
- Fixed mindset vs growth mindset

Mindsets

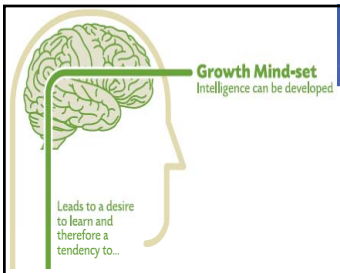
- Mindsets are beliefs—beliefs about yourself and your most basic qualities.
- Are these qualities simply fixed, carved in stone? Or are they qualities you can cultivate?

Fixed mindset

This is the belief that our basic qualities, like intelligence or talent, are **fixed** traits



- Traits are documented *instead of developed*
- Belief that talent creates success—without effort.
- (Nature argument)

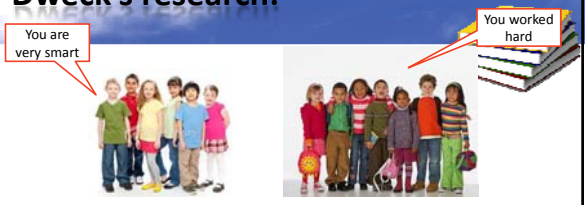


Growth mindset

The belief that our most basic abilities can be developed through dedication and hard work

- brains and talent are just a starting point
- A love of learning (and practice) & resilience are essential for success.

Dweck's research:



- 128 fifth-graders (US) were divided into two groups and given a simple IQ test.
- One group was told they did really well and must be **very smart**.
- The other group was told they did really well and must have **worked hard**.
- (One group was praised for intelligence, the other for effort).

- In the second test: the effort group performed significantly better than the group praised for its intelligence.
- Many of the kids who had been labelled "smart" performed worst … as they believed they should do well without any effort.

What should we be doing in the classroom according to Dweck?

- **Be Specific About Praise and Don't Be Afraid to Withhold It**
- If you know a student didn't study or prepare but received an A, perhaps you should give them a challenge (or encourage them to do a harder task)
- i.e. only praise effort

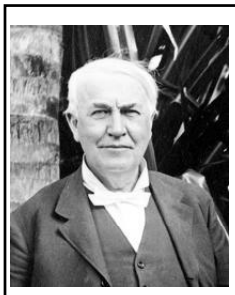
Nature & Nurture

A common assumption is that when somebody is good at something they must have a special gift or talent
i.e. nature (they were born with it)

- Neuroscience: "Use it or lose it"
- Not only do genes and environment cooperate as we develop,
- genes actually require input from the environment to work properly

Henri Matisse

- Perfectionist
- Liked to paint something more than once until he was satisfied



Thomas Edison

"Genius is 1% inspiration and 99% perspiration"

Thomas Edison (1847-1931)

- Had over 1,093 patents
- Of those, not all successes!
- Most famous inventions: the phonograph, the first commercially practical lightbulb, and a motion picture camera (a version)

Edison

- Youngest of 7 children
- "My mother was the making of me. She was so true, so sure of me, and I felt I had some one to live for, some one I must not disappoint."

What should we be doing in the classroom?

- If we believe creativity relies on talent, we are likely to give up if we show no promise
- If we feel that talent is not (or only marginally) implicated we are likely to **persevere & practise**
- (moreover we will seek more opportunities, the right environment, better teachers etc)

"Chance favours the prepared mind"

Louis Pasteur

The Brain

What happens in the brain when we are creative?

- How can creativity or imagination be measured?
- A meta-analysis of psychology research papers from 1950 until 2000 found that only 1% investigated the creative process
(Lehrer, 2012)

A recent study - via a smartphone app – found that people's attention wandered 47% of the time (*Science*, vol 33, p932)

"Often the best way to solve a problem is not to focus"

Jennifer Wiley (*Psychology of Learning and Motivation*, vol 56, p185)

Insight & daydreaming

- Research indicates that people who daydream outperform their peers in insight tasks
- (Benjamin Baird at University of California)
- For example:

Insight

"Trish and Trudy were born on the same day of the same month of the same year to the same father and the same mother, yet they are not twins. How is that possible?"

Insight

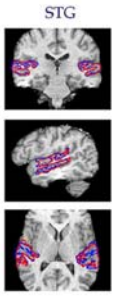
Rearrange the letters n-e-w-d-o-o-r to make one word.

Beeman & Kounios
(2006 & 2008)

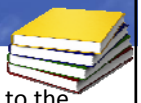
- When trying to solve puzzles we tend to use our logical side of the brain – the left hemisphere
- But…"stumped"
- brain shifts activity to the right hemisphere
- "Aha" or BINGO!

Beeman & Kounios
(2006 & 2008)

- The aSTG (anterior superior temporal gyrus) –just above the ear on the **right hemisphere**
- unusually active just before a burst of insight
- (but remains silent when people use analysis)



Insight



"Trish and Trudy were born on the same day of the same month of the same year to the same father and the same mother, yet they are not twins. How is that possible?"

They are triplets

Insight

Rearrange the letters n-e-w-d-o-o-r to make one word.

The answer is "one word"

Here are some more…

- What single word can be added to "high, book and sour" to make another word or phrase?
- note

Unusual uses task

- In 2 minutes, how many uses can you think up for a brick?

ADHD & Unusual Uses Task

- At the University of Memphis in Tennessee, researcher Holly White used this task
- Participants with ADHD (and therefore lower working memory capacity) did better at this task then those unaffected
- (*Personality & Individual Differences*, vol 40, p1121)

What should we be doing in the classroom? (1 of 2)

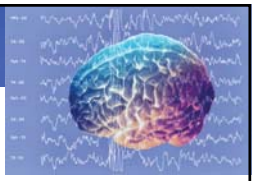
- Too much emphasis on concentration and focus
- Instead we should allow students "brain breaks" in class
- **"one important skill for creativity is the ability to link disparate concepts which you might come across when wandering inside your head"**
  (Jonathon Schooler, University of California)

- That is:
- As your students' brains wander off thinking about the holidays or what is for lunch, their brain is busily mulling over solutions for whatever problem they are trying to solve

What should we be doing in the classroom? (2 of 2)

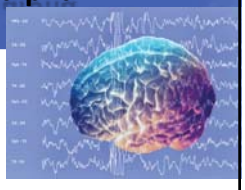
- Give students challenging tasks that they are not able to answer straight away
- Allow them to experience frustration, and hopefully they (at some point) will experience an "Aha" moment when their right aSTG is activated

Brain research

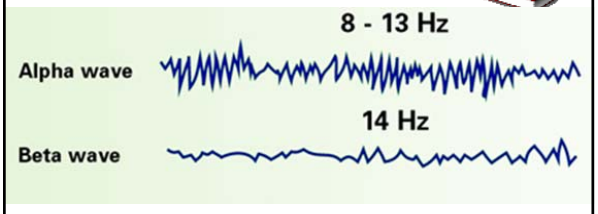


- The beauty of daydreaming – alpha waves

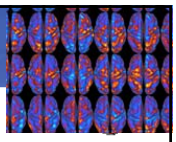
What's so special about alpha waves?



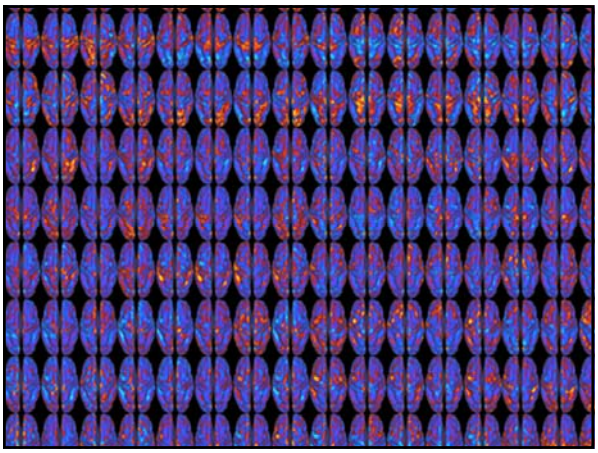
- Alpha waves = slower waves
- Our attention turns INWARD
- We detect connections we didn't detect before
- Relaxed mind = insight & creativity
- Also: people in a positive mood are more likely to experience insight



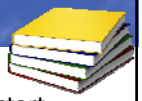
Raichle (2009)



- Raichle, a radiologist & neurologist, studied daydreaming using a fMRI
- Was startled to see higher levels of activity BETWEEN tasks
- = people were relaxed & daydreaming

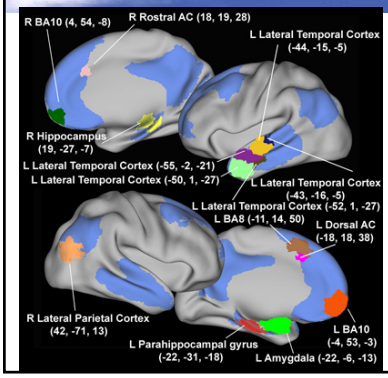


Raichle (2009)



- When daydreaming parts of the brain start interacting that don't usually interact,
- brain searches for relationships
- http://www.nil.wustl.edu/labs/raichle/images/Restless_Brain/restless_brain_dor.html

The "default network"



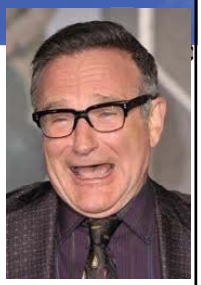
- Regions of brain active during daydreaming
- Default network here shown in blue.
- All of the other colours show regions that are overactive in people with depression.

Default Network

- The default network is also known as the "inner voice"
- Or a mental censor
- "mental handcuffs"
- When it is less active we are more creative

Humour

- Study participants watched either clips of Robin Williams – or a horror clip.
- Those in the Williams group outperformed the horror group in mental puzzles.



"Letting Go"

- Spontaneity & improvisation are two valuable tools in creativity
- They need to be encouraged & taught
- "letting go" is scary for students (…all people!)

Charles Limb

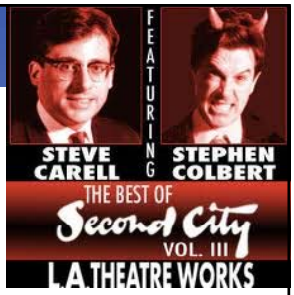
- John Hopkins University
- Found the default network quietens down when musicians are improvising
- The inner voice is quiet

Jonah Lehrer

- **"the lesson of letting go is that we constrain our own creativity"**

Improvisation can be taught

- Second City theatre in LA – school of improvisation



What does this look like in the classroom?

- Use humour with your students
- Create a relaxing environment in your class
- Be unafraid of alpha waves
- students should avoid stimulants such as caffeine and sugar – they supress alpha waves
- Encourage your students to "let go"
- Improvisation can be taught
- Practise makes perfect

Sleep & Dreams

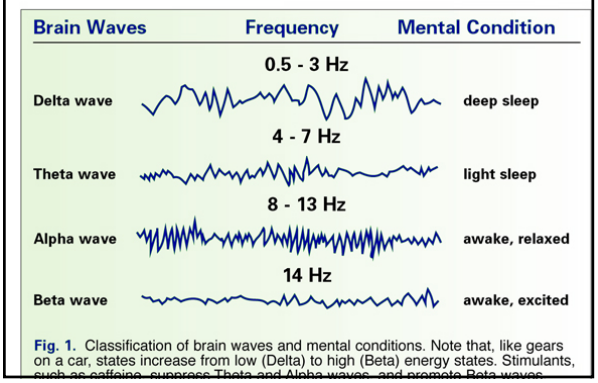


Fig. 1. Classification of brain waves and mental conditions. Note that, like gears on a car, states increase from low (Delta) to high (Beta) energy states. Stimulants, such as caffeine, suppress Theta and Alpha waves, and promote Beta waves.

As we fall asleep….

- Brain waves slow down
- Our prefrontal cortex (and default network) quieten down
- This may explain why our dreams are uncensored
- They are random and have limitless possibilities

Research & Examples

- Sara Mednick at the University of California
- Instructed participants to take a nap.
- Those who reported dreaming in their nap solved 40% more puzzles upon awakening.
- Stephanie Meyer

Keith Richards

When we dream….

- We don't care about logic or truth
- Anything is possible

What does this look like in the classroom?

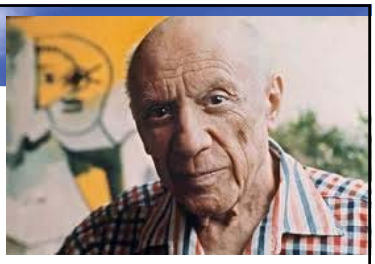
- let your students sleep (!???) but may not be practical.
- SO….encourage students to tap into their dreams if they're stuck on a story, or a piece of art.
- **importantly** you can encourage them not to worry about truth, logic or common sense
- Also – find out if they are a night owl or an early bird. E.g. Night owls should try being creative in the mornings (their "tired" time of day) and vice versa
- (see handout)

Children, autism & dementia

The beauty of children

- The default network is the last part of the brain to fully develop.
- Children therefore have less active networks then their adult counterparts.
- They are a perfect example of creativity.

Picasso



"Every child is an artist.
The problem is how to remain an artist once we grow up."

Michael Robinson

- Group 1 "You have the entire day to yourself. What would you do? Where would you go? Who would you see?"
- Group 2 : "You are seven years old, and school is cancelled. You have the entire day to yourself. What would you do? Where would you go? Who would you see?

Unusual uses task

- In 2 minutes, how many uses can you think up for a brick?

- Those who imagined themselves as a child came up with twice as many ideas as the other group.

Yo Yo Ma

"One needs to constantly remind oneself to play with the abandon of the child who is just learning to play the cello.

Because why is that kid playing?

…he is playing for pleasure.

He is playing because making this sound, expressing this melody, makes him happy. That is still the only good reason to play."

What does this look like in the classroom?

- Do not censor your students in class – if they voice an opinion they are being brave.
- (They already have their own default network – so create an accepting environment)
- Make activities fun (Yo Yo Ma)
- literally get them to imagine themselves as a 7 year old – and see what happens? They may surprise you as well as themselves!

Autism

- Creatively deficit?
- Yes and **NO**

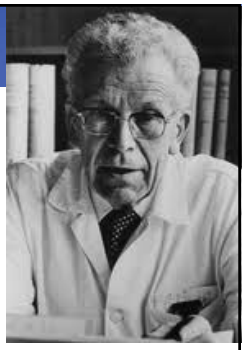
Simon Baron-Cohen

- Cambridge University
- gave a group of autistic children a book of "squiggles"
- He told the children, "I want you to make lots of different things. Be as creative as you can"
- children with autism scored well below normal and they completed 75% fewer sketches than the control group

Hans Asperger

"encompassing preoccupation with a narrow subject…which comes to dominate their life."

"It seems that for success in science and art, a dash of autism is essential."



Clay Marzo

Kelly Slater

"Clay's kind of a surfing freak. He's like a cat, always landing on his feet. He definitely knows things that I don't know."

The Marzo Reverse

- Clay's obsession with surfing allows him to **understand the patterns of the ocean.**
- **As he knows or can predict what he thinks the water is going to do he then is able to improvise**.
- "The Marzo reverse"
- http://www.youtube.com/watch?v=trnpIlaHIZ8

"When I'm in the ocean I don't need to think so much. I don't need to worry. I am just there."

What does this look like in the classroom?

- Children with autism and Aspergers have been claimed to have an "imaginative deficit" …
- **BUT** as Clay Marzo proves: Any child (any person) is capable of creativity.

- When a student is relaxed their expression may improve
- like Clay in the water compared to when he is on land

Dementia

Neurodegenerative disease

Anne Theresa Adams

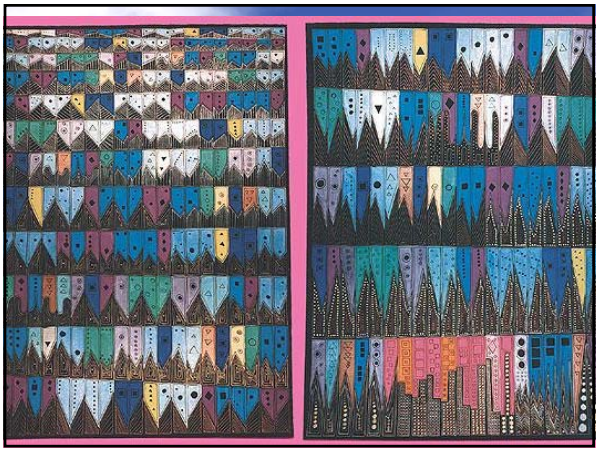
- Cell biologist at University of British Columbia
- At the age of 46 years was overcome by a sudden desire to paint
- She had no prior experience or training
- 10 hours a day

Anne Adams

- High profile commissions; numerous galleries
- 15 years later Anne sadly died from an incurable brain disease

Adam's most famous piece

- "Unravelling Bolero"
- Bar-by-bar representation of Maurice Ravel's popular classical piece
- http://www.youtube.com/watch?v=Urfjyj4FnUc



- Astonishingly (and unknown to Adams) Ravel also had FTD when he composed the piece, explaining the repetition and pattern of the music

Frontotemporal Dementia (FTD)

- Patients with this dementia tend to gravitate towards art, sculpture.
- After a few (maybe several if they are lucky) of ecstatic artistic production, the disease that inspired their art destroys their brains.
- The prefrontal cortex is destroyed at a rapid rate – as is the temporal area which is also responsible for sensory integration.
- This seems like a surreal condition – but we all experience it when we are **sleeping.**

What does this look like in the classroom?

- There is an uplifting moral to this terrible affliction which is that all of us contain a reservoir of untapped creativity.
- The desire to create something innovative or beautiful is not constrained to those with artistic training, for example. Instead we all have the ability.
- Remember then that every student in your classroom has the ability.

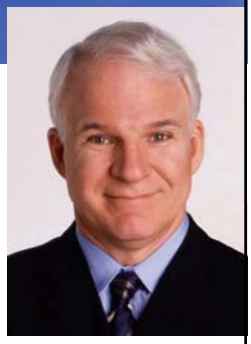
CULTURE

Youth as "outsiders"

- The world is full of natural outsiders – they are our youth and our children.
- They tend to lack cynicism.
- They are naïve.
- Although ignorance may have its drawbacks, it also comes with creative advantages.

Steve Martin

"Despite a lack of natural ability, I did have one element necessary to all early creativity: naïveté, that fabulous quality that keeps you from knowing just how unsuited you are for what you are about to do."



Dean Simonton

- psychologist at UC-Davis
- analysed decades of data and made an interesting discovery:
- physicists tend to make their most important discoveries early in their careers, typically before they are 30 years old.
- The only field that peaks before physics is poetry.

TRAVEL

- Travel is very helpful as it keeps us open-minded
- In a 2009 study at INSEAD by the Kellogg School of Management reported that students who lived overseas for an extended period were significantly more likely to solve a difficult creativity problem than student who had never left their home state.

Lile Jia

- psychologist at Indiana University
- asked students to list as many modes of transport as they could.
- One group was told to imagine they were in Greece whilst the other was just Indiana.
- Those who imagined they were in Greece, listed **twice as many modes** of transport as the group who imagined they were in their home state.

The story of the Barbie Doll

Switzerland

What does this look like in the classroom? (1 of 2)

- Naivety can be a wonderful thing for creativity
- Change the culture in your classroom – keep it varied and interesting so that your students sometimes feel like an "outsider" in a positive sense of the word
- Don't tell students they can't do something. It is better for them to think they are suited for the task. This will give them higher likelihood or higher success rate of being creative.
- Encourage your students to be open minded

What does this look like in the classroom? (2 of 2)

- Get your students to pretend they are overseas, or even on another planet, or perhaps under the sea. This is a common strategy to use by teachers – but clearly a very good one – it encourages the student's mind to travel
- Don't allow their minds be shackled by the familiar
- Encourage your students to travel – spend time away from home

FINALLY, THE MISTAKES WE AS TEACHERS CAN MAKE ABOUT CHILDREN

Do we want creative students?

- Recent study of US teachers
- Asked if they would like creative kids in their classrooms
- Every teacher said "yes"

BUT….

- when asked to rate their students on a variety of personality measures the traits most closely aligned to creativity (such as being “freely expressive”) ….
- ….were also closely associated with their ‘least favourite’ student

Summary of study

- Judgements for the favourite student were negatively correlated with creativity
- judgements for the least favourite student were positively correlated with creativity

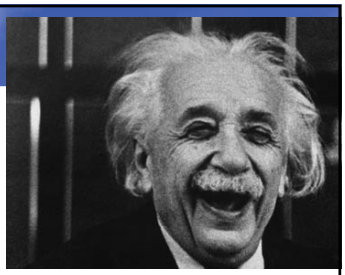
We find creativity challenging as teachers:

- Teachers find daydreamers and improvisers harder to teach, and they also tend to underperform in standardised tests
- As a result daydreamers and improvisers routinely discouraged and dismissed

“I make many changes, and reject and try again until I am satisfied”

Beethoven

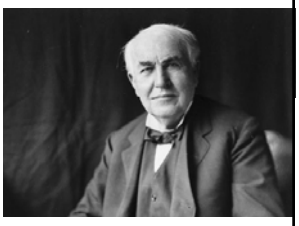
“It is the supreme art of the teacher to awaken joy in creative expression and knowledge”



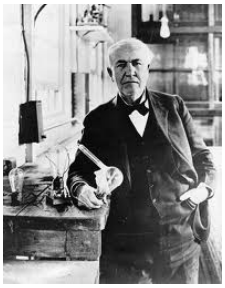
Einstein

Thomas Edison

"Great ideas originate in the muscles"



Thomas Edison



"I have not failed. I've just found 10,000 ways that won't work"

Imagine Cup

- Tech heads compete for the Imagine Cup
- http://media.theage.com.au/national/selections/tech-heads-compete-for-the-imagine-cup-3438209.html?&exc_from=strap

Two squares to three

- Move 4 matches to make 3 squares