Towards Creative and Innovative Learning

Päivi Tynjälä
Major global challenges

- Climate, energy and environment (nature)
- Networked economy (society)
- Well-being and sense of community (human beings)
Ten skills for the future workforce
(Future Work Skills 2020, Institute for the Future for the University of Phoenix Research Institute)

1. Sense-making
2. Social intelligence
3. Novel and adaptive thinking
4. Cross-cultural competency
5. Computational thinking
6. New-media literacy
7. Transdisciplinarity
8. Design mindset
9. Cognitive load management
10. Virtual collaboration

What is needed?

→ New forms of learning:
   - transformative, innovative and creative rather than reproductive
   - social and networked rather than individual
   - ethical and value-conscious instead of "value-free" and "objective"
Creative and Innovative Learning

- Forms of learning that differ from traditional knowledge transmission
- Forms of learning that promote creativity and innovation

http://dailygumboot.ca/2012/04/school-at-work/

Two definitions of creativity (Sawyer, 2012):

**Individualist definition:** *Creativity is a new mental combination that is expressed in the world* (“little c creativity”)

**Sociocultural definition:** *Creativity is the generation of a product that is judged to be novel and also to be appropriate, useful, or valuable by a suitably knowledgeable social group* (“big C Creativity”)

The two definitions are complementary
Lessons learnt from the individualist approaches

Csikszentmihalyi (1990a,b): Creativity, flow and peak experiences

- Clear goals
- High degree of concentration
- A loss of self-consciousness
- Distorted sense of time
- Continuous immediate feedback
- A sense of personal control
- Intrinsic motivation
- A lack of awareness of bodily needs such as hunger
- A focus of awareness to the activity itself
- Balance between ability and the challenge

Learning environment supporting flow experiences?

- Self set goals
- Opportunity to choose between different kinds of tasks
- Opportunity to choose between different levels of difficulty
- Feedback
- Authentic tasks or simulations
- Game environments

Simulations

- Technical equipment (e.g. flight simulators)
- PC / online learning games
- Role play simulations

Simulation games

Teachers’ role as a facilitator important
Lessons learnt from the individualist approaches

Sawyer’s eight stages of the creative process (Sawyer, 2012):

1. Find the problem
2. Acquire the knowledge
3. Gather related information
4. Incubation
5. Generate ideas
6. Combine ideas
7. Select the best ideas
8. Externalize ideas

Instead of being a sudden insight, creative work is intentional knowledge construction process

<table>
<thead>
<tr>
<th>Research on creativity (Sawyer, 2012)</th>
<th>Educational implications</th>
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<tbody>
<tr>
<td>New ideas are always combination of prior experiences and learning.</td>
<td>Activate and utilize previous knowledge</td>
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<tr>
<td>Education is essential to creativity – but rote memorization is not sufficient. Creativity is based</td>
<td>Encourage deep learning. Favor activating methods.</td>
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<td>on deeper understandings that results from focused and active forms of learning.</td>
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<td>Ideas often emerge in conversation, or as a result of conversations you’ve had before. Groups</td>
<td>Favor collaborative learning and teamwork</td>
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<td>play a central role in creativity.</td>
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<tr>
<td>Exceptional ideas sometimes come from people who have experience and training in a different area</td>
<td>Encourage inter-disciplinarity and boundary crossing. Build</td>
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<td>before they began to study new area.</td>
<td>networks.</td>
</tr>
<tr>
<td>The most creative ideas come from people who are deeply familiar with the domain</td>
<td>Support hard working and deep learning.</td>
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</table>
Constructivism and creativity: learning is not about passive reception of information - it is active (re)construction of knowledge

Your head is not empty
You interpret new knowledge on the basis of what you already know
People have different previous knowledge and experiences \(\rightarrow\) different interpretations

\(\rightarrow\) Discussion, interaction, and collaboration are important in learning and creativity

Lessons learnt from the sociocultural approaches

Creativity and innovation are basically social processes

**Characteristics of group flow** (Sawyer, 2007):

1. Match between group and goal
2. Close listening
3. Complete concentration
4. Being in control
5. Blending egos
6. Equal participation
7. Familiarity
8. Communication
9. Keep it moving forward
10. The potential of failure

http://blog.beliefnet.com/savannah/funandfashion/2012/02/teamwork-tf24348386-together-everyone-achieves-more.html
Lessons learnt from the sociocultural approaches

**Group flow process** (Sawyer, 2007):

1. Innovation emerges over time (through series of small insights)
2. Innovation emerges from the bottom up, not the top down
3. The meaning of each contribution becomes clear only afterwards
4. There are many dead ends

http://blog.beliefnet.com/haveamagnificentday/2012/02/teamwork-together-everyone-achieves-more.html

Creativity and the Zone of Proximal Development

(Vygotsky, 1978)

Potential level of development

ZPD

Actual level of development

Together we can achieve more than alone

Power of (multi-disciplinary) collaboration
On the zone of proximal development in space

"Houston, we have a problem here"

Observation of new (Higgs?) boson
Press conference 4th of July 2012, CERN, Geneva

"It required lots of hard work, dedication, collaboration, team spirit"

"It was result of collaboration and competition at the same time, coopetition"
**Project-based learning**
(e.g. Helle et al., 2007; Tynjälä et al., 2009)

Project work is a form of study in which work is project organized, problem-oriented, interdisciplinary, in groups, with student influence” (Webb, 1999)

Components:
- the assignment
- deadline, resources
- teamwork, collaboration
- distribution of work
- documentation
- end product
- assessment

Pedagogical components:
- Integration of different disciplines
- Integration of different elements of expertise
- Self-regulation + guidance + peer support + collaboration
- Reflection and self-assessment (individual + group)

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**Team-based learning** (Michaelsen, Knight & Fink, 2002)

Learning sequence (5-7 per course):
1. Pre-reading
2. Individual test
3. Team test
4. Written appeals from teams
5. Clarifying lecture
6. Application activities
NoviCraft – a multiplayer game to enhance team-building and leadership training

An awareness tool for trainers, HRD specialists and consultants for assessing, building, and developing leaders, teams and team work in organizations.

Experiments combined with other HR activities in the largest Northern bank.

The challenge of continuously changing teams.

http://www.teamingstream.com/


NoviCraft - findings

- The game was experienced as gripping, activating and "best team coaching ever"
- The experiences and reflections of users were related to key areas of team work

Learning leadership skills in a simulated business environment (Siewiorek et al 2011, 2012)

Group-based game + individual reflective essays:
- analysing game experiences in the light of business and leadership theories

- satellite members experienced frustration → virtual teams a major challenge

Inquiry-based learning & knowledge building
Writing as a tool for creating new knowledge

By writing you can, for example:
- activate your previous knowledge
- compare previous and new knowledge
- compare different theories / approaches / cases ...
- reflect on your own experiences (also in the light of theory)
- apply theoretical concepts into real life situations (on paper)
- analyse and synthesise
- criticize
- summarise
- tell a story ...

Writing makes thinking visible

Knowledge telling vs knowledge transforming
(Bereiter & Scardamalia 1984)

Knowledge Forum is based on the philosophy that shared knowledge leads to innovation and growth, whether in a classroom or a business setting.
Knowledge Forum shifts the focus from emphasis on individual learning to the building of group knowledge...

Within a note, scaffolds help users frame and present their ideas to the community. Scaffolds can be customized and changed to suit different purposes and groups.
Users Connect Ideas

Build On

Annotate

Reference

These ideas then become the objects of discourse within the community. Users can build on, reference, or annotate each other's ideas. The ideas in the database become connected and grow.

Users take responsibility for their own learning and the learning of others. Users contribute their ideas to a communal database.
Situationalist theories and creativity?

- Emphasise that learning is always situated in a certain context
- When you learn something in one situation it is not always easy to transfer learning to other situations

- Prefer learning in authentic situations

Situationalist theories and creativity?

Legitimate peripheral participation (Lave & Wenger, 1991) in communities of practice (Wenger, 1998)

- Novices have a right to participate in authentic practices
- Emphasis on socializing novices into existing practices rather than developing new ones
- Significance of context and community
Proposing a model for creative and innovative learning in higher education:

Integrative Pedagogy

Components of professional expertise
(Bereiter & Scardamalia 1993; Bereiter 2002; Eraut, 2004; Le Maistre & Paré 2006
–summarized by Tynjälä et al, 2006; Tynjälä, 2008; Heikkinen et al, 2011; Tynjälä & Gijbels, 2012)
Traditional model of developing expertise

1. Theoretical knowledge
   In classroom

2. Practical knowledge
   Through practical exercises, simulations, and in real life experiences

3. Socio-cultural knowledge

4. Self-regulative knowledge
   Develops itself ????

Integrative Pedagogy
(e.g. Tynjälä et al 2006; Tynjälä, 2008; Heikkinen, Tynjälä, & Kiviniemi, 2011; Tynjälä & Gijbels, 2012)
Integrative Pedagogy integrates:

- Different forms of expert knowledge: theoretical, practical, self-regulative, and socio-cultural
- Different forms of intelligence (analytic, practical, creative)
- Thinking and action
- Conceptual understanding and practical / manual work
- Formal and informal learning
- Domain-specific knowledge and generic skills
- Individual and social learning
- Work and learning
- Possibly different disciplines
- Possibly physical, social and virtual learning environments

Integrative Pedagogy as an integrative construct

Cognitive approach

Research on
- Thinking
- Intelligence
- Expertise

Integration of different forms of knowledge

Socio-cultural approach

Authenticity
Participating in communities of practice
Boundary crossing
Partnerships

Individual level

CREATIVITY
NEW KNOWLEDGE

Community level
Integrative Pedagogy in Teaching Practicum  
Course on Teacher Ethics + Practicum (Heikkinen, Tynjälä, & Kiviniemi, 2011)

- Ethical theories  
- Ethical dilemmas in teachers’ work

PARTICIPATION IN COMMUNITIES OF PRACTICE

SOCIO-CULTURAL KNOWLEDGE

CONCEPTUAL/ THEORETICAL KNOWLEDGE

PRACUTICAL/ EXPERIENTIAL KNOWLEDGE

SELF-REGULATIVE KNOWLEDGE

How to work with high ethical standards?

Creation of new knowledge

Methods:
Writing: analytic tasks, journals, portfolios  
Discussions  
Tutoring, Mentoring, Coaching

Integrative Pedagogy for Learning Communication Skills  
(Tynjälä, Virtanen, Klemola, Kostiainen & Rasku-Puttonen, 2012, in preparation)

- Theories of social interaction  
- Belonging to a group  
- Practical exercises  
- Reflection on experiences in the light of theory

Methods:
Interactive lectures, small group activities, role play simulations, peer reflections, reflective reading and writing, versatile methods of receiving and providing feedback and assessment

http://www.valmentajakoulutus.fi/?x43=144572
Integrative Pedagogy and Project-Based Learning
Development Project Course in Information Systems Design

Integrated with courses:
- Communication Skills
- English

Other theoretical components:
- Theories of project work
- Theories of information systems

Involved:
- a project assignment from a client company
- continuous reflection
- self-and peer-assessment, client assessment, teacher’s assessment

Intrinsic motivation during the project-based course
(Helle, Tynjälä, Olkinuora & Lonka 2007)

<table>
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<tr>
<th>Inventory</th>
<th>Estimated Marginal Means</th>
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<tbody>
<tr>
<td>A</td>
<td>at the beginning</td>
</tr>
<tr>
<td>B</td>
<td>at the end of the course</td>
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</tbody>
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- low in SR
- intermediate in SR
- high in SR
Self-assessed learning outcomes
(Helle, Tynjälä, Lonka & Olkinuora 2007b; Tynjälä, Pirhonen, Vartiainen & Helle 2009)

1) Domain-specific knowledge and skills (e.g. modelling of information systems design; domain-specific methods; programming languages; overall view of the project work and designing an information system)

2) Generic skills (e.g. project management, information management; interaction skills, communication skills, negotiation skills; language skills)

3) Development of professional identity (e.g. development of career plans, identification as an IT professional, strengthening of professional self-efficacy and self-confidence)

Learning by Developing (LbD, Raij, 2007; Kallioinen, 2008) (Laurea University of Applied Sciences)
Close collaboration between the university and the business life

Learning, Research & Innovation, and Regional Development are connected

Projects as key components in curricula

Common features:

- Universities networked with business life
- Learning by producing something new
- All partners are considered as learners

→ Innovative Knowledge Communities (Hakkarainen et al, 2004)
Expanding contexts for learning
Classroom - workplace – lifeplace – virtual place

Need of new kind of pedagogy

Challenges of creative and innovative learning
- Raises emotions
- Requires highly competent and brave teachers
- Requires teachers to be learners
- Requires new forms of assessment

→ Support for teachers is needed
→ Leadership for teaching and learning is needed
Model of promoting innovative learning
(Tynjälä & Nikkanen, 2009)

Origin of new ideas

INDIVIDUALS

- Progressive problem solving
- Extensive cooperative networks
- “Visionaries”

- Needs of working life or society
- Crisis or threat

- Ideas
- Small experiments
- Individual contacts

WORK COMMUNITIES

- Open communication
- Equality
- Innovative activities
- Utilisation of external help
- Working leadership and management

PROJECT ORGANISATION

- Working leadership and management
- Funding sources
- External contacts

Forums for discussion

Spread of experiments in the same field and between fields

Learning Network of University Teachers

Leadership for teaching and learning

Team of teachers in Department G

Team of teachers in Department F

Team of teachers in Department E

Team of teachers in Department D

Team of teachers in Department C

Team of teachers in Department B

Team of teachers in Department A

Social Media tools

Development projects

Network forums
THANK YOU FOR YOUR ATTENTION!