Enhancing social (informal) learning through a community-based water monitoring project

Sub theme: Thinking critically about the hidden mechanisms that make cognitive education work

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Outline of presentation

• Rationale of enhancement of social learning opportunities
• Social (informal) learning defined
• Mechanisms to enhance social learning – project-based teaching approach
• Conclusion
Rationale behind enhancement of social learning opportunities

- Grade 12 results – 05/01/2017
- 10 skills needed in 2020 (Ackerman, 2017)
  10) Cognitive adaptable - multiple concepts
  9) Negotiate
  8) Service oriented skills
  7) Judgement and decision-making
  6) Emotional intelligence
  5) Coordination with other
  4) Management of people
  3) Creativity
  2) Critical thinking
  1) Complex problem solving
Social (informal) learning defined

Influenced by type of data collected and values

Links to practical learning and indigenous knowledge

Aid with social capital

CAPS requirements

Social learning

Bandura (1971; 1977)
Modelling
Live model

Wenger (1998)
COP
Identity
Learning citizenship
Landscape of practices

Keen et al. (2005)
Collective action and reflection

Pahl-Wostl et al. (2007)
Governance

Reed et al. (2010)
Process of social change

Influenced by cultural and socio-economic values

Transformative learning

3 time scales and levels

Double loop learning
Social (informal) learning – Bandura (1971 & 1986)

• “individual learning which takes place in a social context and is influenced by social norms”
• learning through experience.
• respond automatically and unconsciously
• students develop thoughts which guide their future actions
• insightful behaviour
Social (informal) learning – Bandura (1971 & 1986)

Three basic models of observational learning namely:

• a live model - demonstrating a desirable behaviour;

• a verbal instructional model - descriptions and explanations

• a symbolic model - fictional characters that display behaviours - in books, online media, films etc. (Bandura, 1986:50)
Social (informal) learning – Bandura (1971 & 1986)

- Four interrelated processes of modelling
  
  **Attention** - to recognize features of the activity - interpersonal

  **Retention** - how well a student can remember the activity; reproduce it in the long term or permanently

  **Motoric reproduction** - response of the student according to the modelled pattern

  **Self-reinforcement and motivation** - overtly express action after being exposed to modelling.

- community of practice (COP)
- Identity
- learning citizenship
- landscape of practices.
COP – Wenger (1998)

- COP = social learning system
- Mutual engagement of five domains namely:
  - (a) the *discipline of domain* - what we *care* about;
  - (b) the *discipline of community* - the effects of participation on the trust and dynamics of the group;
  - (c) the *discipline of practice* - how our practice can become curriculum and visible
  - (d) *discipline of convening* - leadership, *sustainability* of partnership, the roles of participants and needed resources;
  - (e) the *social discipline* - *personal responsibility* which comes with social participation

- includes all memories, competencies, events, stories and relationships a student has with people and places.
- a nexus of *multi-membership* as students belong to multiple communities at any given time.
- is *multi-scaled* due to the sharing of experience with others in the same scenario or those who share our world.

- how identity is *invested in a community*
- the ability to *contribute in their communities*
- *bridge boundaries* by using their multi-membership
- the ability to be *involved in more than one group* of participants as a *trusted* member
- able to *identify need in a community* and connect to other to *enhance learning*
Landscape of practices – Wenger (1998)

- not only based on curriculum content
- dynamic as communities emerge, split, compete or complement each other
- between the landscapes of practices there are boundaries - possible misunderstandings between commitments, values or perspectives
- learning can be positioned in one of three modes:
  (a) engagement - doing of things and direct experience in activities;
  (b) imagination - the construction of an image of the world to aid with understanding
  (c) alignment - the coordination of activities
Social (informal) learning – 2005 and on

- **Collective action and reflection** - demonstrate a change or understanding *beyond the individuals* or small groups (Keen, 2005)
- **Governance** - the *legal and organizational structure* as well as the cultural and socio-economic environment (Pahl-Wostl *et al.*, 2007)
- **Process of social change** beyond the individual level in *wider social context*. Need *to learn* from each other in ways which benefit wider social-ecological systems. Can *improve management* of social-ecological systems - *outcomes* (Reed *et al.*, 2010)
Mechanisms to include social (informal) learning at educational institutes
Context: Water sources of NWU (Vaal Campus)
NWU Vaal Campus dams....
Context

• Drought – water shortage – poor water quality
• 3 factors – lack of strategic planning; lack of skills; poorly functioning waste water treatment plants
• Globally universities required to shift to problem-solving and applied research
• Universities need to bridge the gap between scientific knowledge and societal needs
• Schools: NEIMS report of 2014: 20 463 schools – no laboratory; 474 no ablution facilities; 604 – no water supply.
• Study links educational institutions in South Africa with community-based monitoring
Overview of project

Water monitoring project

Citizen science
- Community-based water monitoring

Environmental education
- Social learning
- Project-based teaching

Water quality management
- Adaptive management
- Public participation
Citizen science: Community-based water monitoring

Citizens are involved in science as researchers.

Aims to develop scientists in communities.

Benefits: Increased environmental democracy; scientific literacy; aids with social capital – community development and sustainable communities.
Water monitoring project at the NWU (Vaal)

Lecturer

Student with learners

Community

Students

Learning - self-directed; social awareness

Educated; responsible

Water health

Expert: Rand Water

Adaptive management
Mechanism - Project-based teaching approach
Project-based teaching (Doppelt, 2003; Markham, 2011; Solomon, 2003)

- Broad class of learning experience
- Challenge to solve real-life problems
- Core curriculum – learned and applied
- Learn through experience
- Classroom = World
- Focus: environmental concerns

Focus: environmental concerns
Project-based learning (Doppelt, 2003; Solomon, 2003; Brundiers \textit{et al.}, 2010; Markham, 2011)

- Active learning – learner centered
- Raise awareness of learning activity – responsibility and ownership
- Real-world learning opportunity
- Different regarding expertise and experience; equality in rights and obligations
- Place-based Partnership - educational institutes and communities
- Communities of Practice
- Teamwork
- Clear objectives
- Provides psychological safety
- Promotes social learning

Project-based learning
| Phase A - problem identification and structuring |
| Build a collaborative research team |
| Joint understanding and definition of problem and research object: |
| What is Water Quality? |
| How do we test for water quality? |
| How can communal water quality be enhanced? |

| Phase B - actual research |
| Methodological framework - knowledge production and integration |
| Research design: Concurrent Embedded Mixed Method |
| Research methodology: Action research |
| Strategy of inquiry: Multiple case studies |
| Integration of knowledge: |

| Collection of data: |
| Interviews |
| Document reviews |
| Open-ended questions |
| Photographs |
| Observations |
| Journal of researcher |

| Phase C - results to fruition |
| Scientific impact - scientific report on water quality of NWU (Vaal Campus) water storage resource |
| Social impact - social capital; schools as communal WQ testing facilities |
| Adaptive management - Proposals NWU (Vaal) campus water sources |

| Integration of knowledge: |
| Environmental education and social learning at educational institutes - three tiered system |
| Reflection on practises: |
| Generic framework for community-based monitoring in citizen science |
Qualitative findings – Pre-service teachers on campus

• Gained subject knowledge
• Gained practical skill to perform water quality tests
• Social capital – benefit for their communities
• Indicated a responsibility towards the environment
• Enjoyment – monitoring, teaching, presenting
• Group work – bonding; better performance
Qualitative findings – Pre-service teachers in schools

- Monitoring on campus was good exposure
- Have practical skills
- Opportunity to indicate knowledge
- Exposure to classroom management
- Confidence to teach
Findings - learners

• Enjoyment
• Opportunity to learn
• Easy to perform water quality tests – guided and clear instructions
• Diverse new knowledge
• Clean water is safe for human use
NWU (Vaal Campus) citizen science generic framework

Citizen science model: project name

Real life relevance - activities

Context
- Scope
- Scale

Affected natural resource
- Available participants
- Outcomes of Education
- Environmental outcomes

Roles of participants
A three-tiered social-ecological system for citizen science projects which aid with natural resource management at educational institutions.
Conclusion

• Gain for all involved
• Pre-service teachers & learners – knowledge, skill, social capital
• GCI – research
• Campus management and technical services – adaptive management proposals
• Schools – subject knowledge and prescribed practical
• Researcher – knowledge of students; informal learning – valuable; project-based teaching approach
Conclusion

10) Cognitive adaptable - multiple concepts √
9) Negotiate √
8) Service oriented skills √
7) Judgement and decision-making √
6) Emotional intelligence √
5) Coordination with other √
4) Management of people √
3) Creativity √
2) Critical thinking √
1) Complex problem solving √
Bibliography


“It creates a bigger and better perspective of the world for me” - Cheney