

# Experience-based learning in the geo-information science: 15 years of Nuts Game

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## Introduction

- Experiences
- Spiral Model of Learning Methodology
- Natural Resource Management Module
- Experience-based learning methodology, particularly developed for adult education



## What to expect?

- Trends in the surveying profession
- Experience-based learning
- Spiral Model of Learning Methodology
- Examples of typical exercises, one in particular, the so-called “Nuts Game”
- A promising approach for training of land professional?



## Trends in the surveying profession

- Changing nature of the surveying profession
  - From an engineering and technical discipline  
**surveyors**  
*measurement*
  - Towards a more managerial and multidisciplinary profession  
**land professionals**  
*management*



## Trends in the surveying profession

Enemark (2007, 2009):

- Management skills, versus specialist skills
- Project organized education, versus subject based education
- Flexible curriculum, versus fixed course structure
- Virtual academy, versus classroom lecture courses
- Quality assurance, versus fixed standards
- Lifelong learning, versus vocational training



## Trends in the surveying profession

- University and training institutions looked for new ways to respond to these trends and the challenges they represent
  - Problem-based learning
  - Blended learning
  - Body of Knowledge
  - Research-based education
  - Distance Education



## Trends in the surveying profession

- But, what I am doing for more than 15 years...
- ...isn't this typical an educational approach with a potential for training of future land professionals?
- Let's explore more these experiences!



## Experience-based learning

### The Case of the NRM Module 1

Introduction to Natural Resource Management

Master of Science Degree and Postgraduate Diploma Course in Geo-information Science and Earth Observation for Natural Resources Management

ITC, Enschede, The Netherlands.



## Experience-based learning

### Why?

- Mid-career professionals
- Adults students
- Mainly from developing countries
- Wealth of knowledge and experience
- Organisation and working situation
- Multi-disciplinary teamwork



## Experience-based learning

### Why?

- Problem solving
- Critical thinking
- Independent learning
- Presentation and communication skills
- Reading and writing skills



## Experience-based learning

### What?

- Experiential Learning is the process whereby knowledge is created through the transformation of experience (Kolb, 1984)
  - Professional experience
  - Experiences in individual and group work
- Systematic exchange, analysis and reflection of experiences



## Experience-based learning

Kolb (1984) describes a four-stage cycle involving four adaptive learning modes:

- concrete experience
- reflective observation
- abstract conceptualisation
- active experimentation

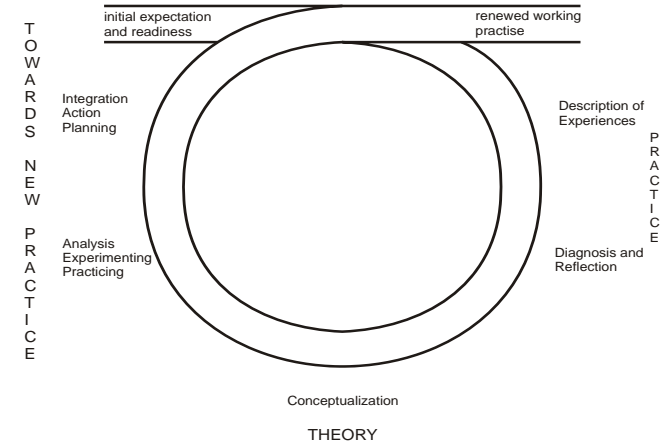


# Spiral Model of Learning

1. Initial expectation and readiness
2. Description of students experiences
3. Diagnosis and reflection on experiences
4. Conceptualisation and analysis
5. Analysis, experimentation and practice
6. Integration and action planning



# Spiral Model of Learning



## Step 1. Initial expectation and readiness

### Aim

- Develop shared learning perspective
- Create favourable learning conditions

### Learning tasks

- expectations of the students about the course
- developing an open atmosphere of mutual respect, trust and commitment



## Step 1. Initial expectation and readiness

### Activities

- Students' Expectations
  - expectations of the students about the course
  - shared learning perspective
- Conditions for Learning
- Formation of Committees



## Step 1. Initial expectation and readiness

### Formation of Committees

Students are invited to take part in one of the following committees:

- Reporting committee
- Animation committee

After an introduction, students have complete responsibility for these committees.



## Step 1. Initial expectation and readiness

### Reporting committee

- Daily reports
- Input to next tasks
- Presentation and discussion
- Final report

1993: Written reports, collected

2008: Interactive powerpoint presentations with digital photos, uploaded in Blackboard; Wiki



## Step 1. Initial expectation and readiness

### Animation committee

- good working atmosphere
- promotes active participation
- social activities

1993: ice-breakers, animation games

2008: traditional music, dances, You Tube films



## Step 1. Initial expectation and readiness



## Step 2. Description of experiences

### Aim

To systematize present knowledge on Natural Resource Management of students within their working context

### Learning tasks

- knowledge and ideas/perceptions
- working experience and practice
- regular working behaviour or attitude
- working or institutional context



## Step 2. Description of experiences

### Activities

- "Seeing" Natural Resource Management
- Definition of NRM
- Participants' Contributions to NRM
  - *'How does your own work contribute to NRM?'*
- Institutional Objectives in NRM
  - *"What are the objectives/mission of your own organisation in Natural Resource Management?"*
- Success and failure in NRM



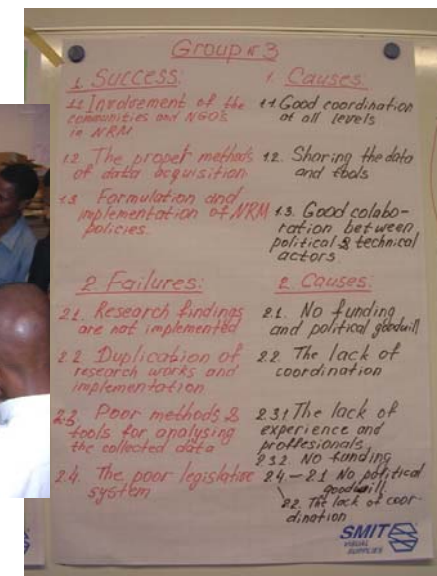
## Step 2. Description of experiences

### Success and failure in NRM

The focus in this exercise is on success stories (what went good and why?) and the failures (what went wrong and why?)



## Step 2. Description of experiences



## Step 3. Diagnosis and reflection

### Aim

Comparison of a priori ideas of their situation with the emerging picture of actual practices and conditions under which these practices develop



The identification of gaps between their **actual work practice** (what they really do) and **desired situations** (what they think they do)



## Step 3. Diagnosis and reflection

### Activities

- Compare outcome of tasks and exercises in earlier steps
- Various rounds/iterative
- "Awareness"

Enables students to evaluate their role in the past and motivates for further learning



## Step 3. Diagnosis and reflection

### The village sketch map

Students are asked to draw a sketch map of a village they know very well

They are asked to include aspects of build up area, different land uses, infrastructural features, water ways, elevation and other relevant aspects of the landscape.

A legend is added to the map.



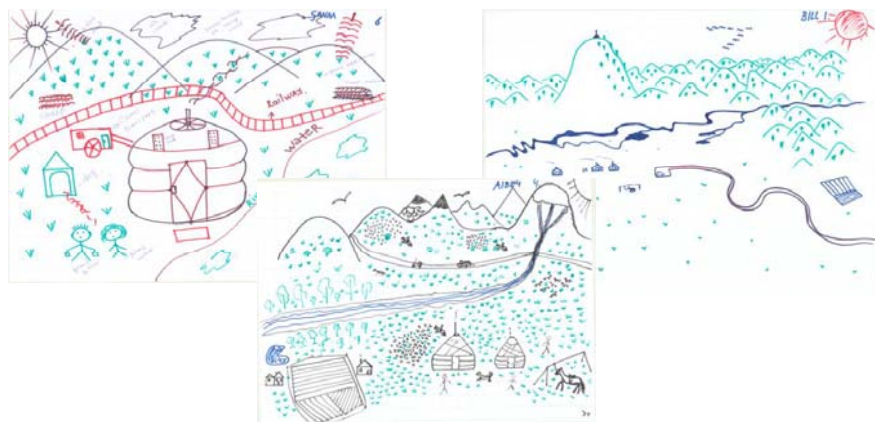
## Step 3. Diagnosis and reflection

### Sketch maps are used to discuss:

- The natural resource areas
- Location
- Trends (increasing/decreasing area)
- The actors involved in managing the natural
- Issues of resource tenure
- Importance of geo-spatial information for Natural Resource Management



## Step 3. Diagnosis and reflection



Tailor-Made Course 2008, Mongolian students



## Step 3. Diagnosis and reflection



## Step 3. Diagnosis and reflection

### Outcome

The key issues and problems in Natural Resource Management are identified

Students aware of their knowledge gap



## Step 3. Diagnosis and reflection

### Key issues in NRM

1993

- Participation
- Multi-disciplinarity
- Sustainability
- Spatial variability

2008

- Sustainability
- Actors and their objectives
- Competition and Conflicts
- Global Context





## Step 4. Conceptualisation and analysis

### Aim

To systematise and conceptualise explanations for the identified gaps and issues in NRM.



## Step 4. Conceptualisation and analysis

### Learning tasks

- The key issues identified in earlier stages are now further studied
- The main elements for a framework for a multi-disciplinary approach in NRM are developed, the emphasis of which on the role of geo-information in NRM.



## Step 3. Diagnosis and reflection

### Key issues in NRM

#### 1993

- Participation
- Multi-disciplinarity
- **Sustainability**
- Spatial variability

#### 2008

- **Sustainability**
- Actors and their objectives
- Competition and Conflicts
- International Context



## Step 4. Conceptualisation and analysis

### Activities in the block **Sustainability**

- The Nuts Game
- Literature search
- Ecological Footprint



## Step 4. Conceptualisation and analysis

### The Nuts Game

- To reflect on stakeholder behaviour with respect to the management of natural resources
- To recognise the role of institutional mechanisms to ensure sustainable use of natural resources



## Step 4. Conceptualisation and analysis

### The Nuts Game

- Teams of 5-7 participants;
- Each team gets a bowl and a number of nuts
- A scoring table (Harvest Recording Sheet).



## Step 4. Conceptualisation and analysis

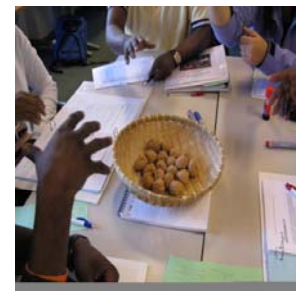
### The Nuts Game

Each player's goal is to accumulate as many nuts as possible during a so-called life cycle. A life cycle consists of one or more seasons. After an explanation of the rules, the teams start the game



## Step 4. Conceptualisation and analysis

### The Nuts Game



## Step 4. Conceptualisation and analysis

### The Nuts Game



## Step 4. Conceptualisation and analysis

### The Nuts Game



## Step 4. Conceptualisation and analysis

### The Nuts Game (students NRM 2000):

- People are “greedy”
- Powerful people profit most, others “hungry”
- Everybody for his own sake is not sustainable
- Rules needed for sustainable use of natural resources
- Control!
- Everybody supposed to follow the rules, if not it will not work
- Women are best resource managers: equal representation
- Democratic rule/decision maker



## Step 5. Analysis, experimentation and practice

### Aim

Under field conditions students validate their new insights and approach, which contributes to further learning and consolidation of concepts

Students are responsible for the planning, organization and reporting of this one-day fieldtrip.



## Step 5. Analysis, experimentation and practice

### Reporting

1993

- Presentation

2008

- Presentation
- Poster
- Article for ITC Newsletter
- Nature Walk for NGO based on Mobile GIS and placed in Google Earth



## Step 6. Integration and action planning



## Step 6. Integration and action planning

- Concepts and approaches developed in this introductory module serve as a framework for the remaining part of the course
- Regular moments of reflection on the learning progress throughout the course are organized in which the learning experiences of the students are integrated in the framework
- At the final stage of the course, students prepare themselves for the implementation of the developed framework in their own working situation: the training spiral is becoming a full cycle



## Conclusion

**Spiral Model of Learning Methodology...**

**... a promising approach for education of the future land professional?**



# Conclusion

Enemark (2007, 2009):

- Management skills, versus specialist skills
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# Conclusions

Spiral Model of Learning applied in the NRM Module

- Sustainable curriculum
- Flexible
- Student-centred
- Life-long learning
- Continuous Professional Development
- Management skills

**A promising approach for education of the future land professional!**



The end  
Thank you !



## Education at ITC

A multicultural environment



## Mission

- Provide international education through knowledge exchange
  - Capacity building
  - Institutional development
- For and in economically and technologically less developed countries



## Target group

- Primarily mid-career professionals and scientists from developing countries
- Increasingly professionals from industrialised countries



## Educational courses

- Diploma courses:
  - Postgraduate diploma 9 months
  - Diploma 9 months
- Degree courses:
  - Master 12 months
  - Master of Science 18 months
- Joint education courses 9 - 18 months



*Language of instruction is English*

## ITC's core activities

- Education / training 50%
    - Diploma course
    - Postgraduate diploma
    - Degree courses
    - Short courses
    - Refresher courses
    - Joint education courses
    - Distance education courses
- In the Netherlands and abroad



## ITC's core activities

- Research and Development 25%
  - Research projects
  - PhD studies
  - Visiting Scientists



## ITC's core activities

- Project services 25%
  - Institutional development
  - Contract training
  - Contract research and development
  - Advisory services

