Are compromises acceptable?
The case of the science curriculum in Iceland

Overview
- Introduction
  - Education in Iceland
  - Curriculum and decision-making
- Background on the science curriculum in Iceland
  - Development through time
  - The 1999 curriculum
- Overview of the Intentions and Reality research study
  - Research questions
  - Data and participants in the school study
- Results
  - Voices/agents and the construction of the curriculum
- Discussion – returning to deliberation

Education in Iceland
- Iceland – population of nearly 310 000
- Preschools – aged 18 months to 5/6 years
  - Under local management
- Compulsory schools – age 6 to 15
  - About 180 schools, 45 000 students
  - Under local management
- Secondary schools – age 16-19
  - Academic and vocational options
  - About 30 schools
  - Under the management of the Ministry
- University and technical options
  - Public and private organisations
The curriculum process e.g. PISA
Dominant perspective

Constructing the curriculum e.g. ICT
Reconceptualist perspective

Curriculum deliberation
Reconceptualist perspective (Reid 1994)

- Curriculum planning is a theory of action, of decision-making
  - Administrative perspective
    - Set of techniques – systems, linkages, objectives
  - Pragmatic (operational) perspective
  - What works
- But, questions of value, interests, ideals are important
  - Schools are not delivery systems but socio-technical creations with histories; decision-making should have a moral quality
- Reid (and Schwab) propose a deliberative perspective
  - Inquiry process – moral and logical account of how problems are to be solved
  - Can be used to understand and conduct curriculum planning

Robertson et al., 2003
Development of the science curriculum in Iceland

1960s
- Local studies 7-9 years
- Science 10-14 years

1960s to 1989
- Revision of the national curriculum and discussion
- Science for the early years included

Late 1960s to late 1970s
- Development of new materials in physics and chemistry in the early 1970s – curriculum guidelines
- New materials in biology in mid-1970s and draft guidelines in late 1970s

Mid-1980s to 1989
- Revision of the national curriculum
- Discussion Science for the early years included

1995/6-1999
- Major revision of the science curriculum
- Two phase process

2005 onwards
- Working group, second group, new curriculum 2007

The 1999 revision of the national curriculum

- Previous curriculum 1989
- Revised 1996-1999 – clear ministerial decision
  - Project manager appointed
  - Management committee
  - Subject coordinators
- Preparatory groups 1996-1998
  - Led by academics, preparation of goals and aims
- Workgroups 1998-1999
  - Composed of teachers and teacher educators, preparation of aims and objectives
- Simultaneous release of all subject areas

The structure of the national curriculum 1999

- Compulsory and secondary school produced at the same time
- Two new subjects – IT/ICT and life-skills
- Compulsory schooling
  - 10 subjects
  - 1st – 10th grade
  - Final goals 10th grade
  - Aims 4th, 7th and 10th grades
  - Objectives for every grade in most subjects

The content of the 1999 science curriculum

- From the physical sciences
- From the earth sciences
- From the life sciences
- About the nature and role of science
- About methods and skills

- The structure of the national curriculum 1999
- The content of the 1999 science curriculum
The content of the 1999 science curriculum

About the role and nature of science
- Practical knowledge
- Scientific knowledge
- The history of science
- Science, technology and society
- Attitudes to the environment, nature and science

About methods and skills
- Definition of the problem
- Planning and organisation
- Implementation, recording and data analysis
- Interpretation and evaluation
- Presentation and communication

From the physical sciences
- Matter and properties of matter
- Force and motion
- Light, sound and waves
- Electricity and magnetism
- Energy and energy use

From the earth sciences
- The earth in the universe
- Air, land and water
- Geology, geomorphology

From the biological sciences
- Char. and diversity of living things
- Life cycles
- Genetics, adaptation and development
- Relationship of living things and their environment
- Structure and function of living things
- Behaviour of animals

Science and technology education: Intentions and reality

- Project funded by the Research Fund of Iceland and co-funded by the Iceland University of Education 2005-2007
- Twelve researchers, including three doctoral students
  - Compulsory school and secondary school
  - Preliminary results emerging
- Research question:
  - What is the nature of the gap between the intended curriculum and the actual curriculum – the intentions and the reality?
- Methods
  - Documents, questionnaires, on-site visits, interviews with principals, teachers, pupils, district leaders
  - Participants in school-based research – five districts, 4-6 schools per district
- Follow-up of study carried out in the early 1990s
- NOTE: Also other studies in science and technology education by researchers, including doctoral studies

Construction of the curriculum
Voices/agents and activity systems

**Voices of policy – official initiatives and programmes**

**Voices of teachers – professional ability and curriculum interests**

The construction of the science curriculum

- District
- School
- Class

Voices of local authorities

Voices of developers of curriculum materials

Voices of learners – understandings of science, expectations of teaching

Voices of principals
Policy-makers – national priorities

- Highly developed small country technologically, new approaches to science and technology policy-making
  - Policy council with ministers, scientists and the private sector
  - OECD evaluations and benchmarks
  - Individuals can make a difference
- The development of the 1999 national curriculum
  - Parallel to rather than an integral part of the ministry’s activities
- National science curriculum
  - Detailed aims and objectives about what learners should know and be able to do
  - Prescriptive in its nature
  - Knowledge of and knowledge about science
  - National optional science assessment in 10th year
- Many parties voice their concern about numbers entering science and technology; some initiatives at national level

Local authorities - framing the work of the school

- Laws on education, the national curriculum
- The school board – political or not?
  - District policy – role of school principals
  - School support and development services
- Administration
  - Monitoring, supervision
  - Contracts with teacher unions
- Facilities
  - Development
  - Maintenance and renewal
  - Relationships with other local organisations

Curriculum materials - a centralised source

- National Centre for Educational Materials
  - Monopoly in compulsory schools
  - Run on a tight budget allocation
  - Editors for different subject areas, work sub-contracted
  - No scope for trial editions or development projects
  - New law being prepared
- Revision of science materials
  - 8th-10th year – 1995-2000 - translation and adaptation from USA
  - 5th-7th year – 2000-2002 – developed in Iceland w.r.t. natl. curr.
  - 1st-4th year – since 2000 – developed in Iceland
  - Development of teaching webs
- Newsletters, meetings in rural areas

The voices of learners

- Learner’s image of scientific careers often seems distorted in a negative way
- Learners call for more hands-on experiments, visit to companies and outdoor activities
- Science is regarded as important for having more education opportunities after upper secondary
- Science is regarded as a relatively demanding subject
- Expectation of success in science is low
The principal’s voice – curriculum leadership

- Independence of schools
  - Principals can cooperate, cannot be coerced
  - Leadership, management and administration
  - Educational specialist, curriculum teaching and learning
  - Development/renewal of the school curriculum
  - Adherence to the curriculum, monitoring
  - Manager – distributed leadership, conditions of service
  - Administration – level of freedom at local level

- Community
  - Staff – choice of staff
  - Culture within the school
  - Relationships with parents and the local community

The voices of teachers – interests, abilities and self-confidence

- Generally positive views towards science
  - The curriculum
    - The national curriculum seen as providing support and guidance in younger classes but constraining and overwhelming in older classes
    - The taught curriculum is largely from textbooks
  - Lack of specialised teacher knowledge in science –
    - Lack of confidence in practical work and in physics and chemistry
  - Inadequacy of equipment, facilities and resources through variable between schools and districts
    - Facilities need to be built up and resources organised
    - Teachers need support and time to organise and build up resources
  - The status of science and innovation education could be enhanced

......we trust ourselves...

- I think, yes, yes we trust ourselves completely [in taking decisions]. And particularly perhaps because we support from above. That is, you know, they say to us: you don’t have to cover everything. We don’t intend, you know, to do exactly everything which is proposed
- Or read and tick off every single aim

One ought to follow it ....

B: I haven’t actually formed an opinion yet, not a direct opinion. One goes into it. One follows it. One ought to follow it.
M: Yes...
B: I haven’t really thought about it maybe directly on how one could do it differently – just as long as it is sufficiently clear
... but not like the bible ....

M: Yes it is naturally just copy and past from the prospectus. Ef you teach the Auðvitað series then you are more or less safe with the National Curriculum

M: But of course one doesn’t follow the curriculum like the bible. Not completely

The voices of teachers – the curriculum

- Generally positive views towards science
- The curriculum
  - The national curriculum seen as providing support and guidance in younger classes but constraining and overwhelming in older classes
  - As teachers gain experience they use the curriculum less and less
  - The taught curriculum is largely from textbooks
    - 1st-4th New since 1999 on basis of curriculum
    - 5th-7th New science 1999 on basis of curriculum
    - 8th-10th Translated in mid 1990s – guided curriculum

Conclusions

Policy-makers
Knowledge of and about science; what the student should know and be able to do

Teachers
Lack subject knowledge; rely heavily on published materials; afraid of practical work

Local authorities
Can support school development if schools are willing

Principals
Curriculum leadership matters but is generally weak

Developers of materials
Follow the national curriculum closely; high standards; web-based material

Learners
Limited knowledge of science and technology in society; want more practical work

2006-2007
Deliberation - for understanding and conducting curriculum planning (Reid 1995)

- Should reflect the logic of the process of curriculum planning
  - The problem is about what to do and requires a practical solution; problems demand actions
- Should respect the practical and institutional nature of the curriculum of schooling as it has been historically determined
  - Grading, classrooms, nationalism
- Should enable potentially conflicting interests which can legitimately influence curriculum decisions to be reconciled
  - Ideals and organisations; personal, practical, organisational and critical interest; action and purpose
- Should reflect the moral and ethical character of curriculum planning
  - Must avoid the vices which follow the individual interests

Teaching as practice - curriculum as practice
Decision-making and compromises

- Teachers and curriculum planners are concerned with reconciling interests of individuals and groups
  - Fosters qualities of character
- Teachers feel competing pressures and must resolve them through practical actions
  - Outcomes are not entirely predictable
- Curriculum deliberations are moral decisions not technical measures
- In curriculum planning decisions are made
  - Compromises are inevitable

The real question is: Are the decisions made in constructing the curriculum *moral or technical* in nature?

Are the decisions themselves acceptable?