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

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Overview

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  - Curriculum perspectives
- 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
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*

**ANTECEDENTS**

- Country Circumstances
- Classroom Conditions
- Characteristics of Students

**CONTEXT**

- Educational System
- School or Classroom
- Student

**CURRICULUM**

- Intended Curriculum
- Implemented Curriculum
- Achieved Curriculum
Constructing the curriculum e.g. ICT
Reconceptualist perspective

Voices of policy – official initiatives and programmes
Voices of teachers – professional and curriculum interests

The construction of the ICT curriculum

Voices of ICT – interests of software developers
Voices of pupils – out of school use of ICT

Robertson et al., 2003
Curriculum deliberation

Reconceptualist perspective (Reid 1994)

- Curriculum planning is a theory of action
- Curriculum planning
  - Administrative perspective
    - Set of techniques – systems, linkages, objectives
  - Pragmatic (operational) perspective
    - What works
- But, questions of value, interests, ideals important
  - Schools are not delivery systems but socio-technical creations with histories
- 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
Activity theory – activity systems

CONTEXT

- Planning agent
- Rules

OUTCOME

- Mediating tools
- Community
- The science curriculum
- Division of labour

The science curriculum
Development of the science curriculum in Iceland

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

Mid-1980s 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 1976
- New materials in biology in mid-1970s and draft guidelines in late 1970s

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

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

Earlier research

IR Research
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 an academic, 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 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
- Other studies in science and technology education by researchers
Construction of the curriculum
Voices/agents and activity systems

Policy-makers

Local authorities

Developers of curriculum materials

Teachers

Principals

Learners
Voices of teachers – professional ability and curriculum interests

**Voices of policy – official initiatives and programmes

Voices of local authorities

Voices of developers of curriculum materials

The construction of the science curriculum

- District -
- School -
- Class -

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 curriculum
  - Detailed aims and objectives about what learners should know and be able to do
  - Prescriptive in its nature
  - 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 -

- The learners image of scientific careers often seems distorted in a negative way.
- The learners call for more hands-on experiments, visit to companies and out-door 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 primarily 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
**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

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**2006-2007**

The constructed science curriculum

District
School
Class
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

- 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
  - Compromises are not acceptable, they are inevitable
- The question is: Are the decisions being reached in constructing the curriculum moral or technical in nature?