Design and implementation of ICT-supported education for highly able pupils

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Overview

1. Introduction
2. Theory
3. Method
4. Results
5. Discussion

1. Introduction

“High ability”: indicators:
- four years: may read, write, do arithmetic, or exceptional social / emotional or expressive performances
- in one or more areas of development
- important: family and environmental support, self-regulation, coaching at / above actual levels of competence
- if not realised: forced underachievement, potentials not actualised, unhappy, low motivation, bored, not liking school, disturbing, low school achievement

Age- or norm-based selection in school: problem for high ability pupils

Longitudinal cohort study: pre-school characteristics and teacher’s perception of pupil’s functioning 2002 – 2004

Indications:
- class size: larger number pupils in class, negative effects
- age-based monitoring: negative effects
- class mean performance: higher mean, negative effects
- acceleration: skipping grade(s) has positive effects

Risk --- OK --- Risk

Age mean

• General IQ
• Language perf.
• Arithmetic perf.
• Social behaviour
• Emotional behav.
• Motor behaviour

• General IQ
• Language perf.
• Arithmetic perf.
• Social behaviour
• Emotional behav.

Differences z-scores 2004-2002; grade 2-4

Language 2-4
n = 8,105
Arithmetic 2-4
n = 7,735
2. Theory

**Research: Curricular interventions and effects**

1. Curriculum or content directed (compacting, projects)
   - Generally: positive cognitive effects on gifted pupils
   - Non-gifted may even profit more
2. Social comparison processes and effects
   - Specific school-subject developments in achievement and self-concept
   - High competition between pupils or classes – high levels of test anxiety
   - Special programmes improved motivation, achievement, and self-concept
3. Educational acceleration / skipping class(es)
4. Saturday or summer school programmes

**Age-based versus criterion-based learning and assessment**

- **Age- or norm-based learning:**
  - mean-based tasks and specific adaptations
  - tasks or activities may not fit individual competence
- **Criterion-based learning:**
  - series of tasks according to psychometric criteria
  - curriculum: absolute evaluation, continuity in progress at own levels of competence

**Pupil level: self-regulation and learning tasks**

- **Zimmerman (2000):**
  - self-regulation: self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals
- **Competence-based learning:**
  - estimation of difficulty level of task - selection
  - types of support or coaching of task execution
  - assessment or evaluation of results

**Self-regulation cycle of learning task selection, coaching, and assessment**
Education as a multilevel system

Systemic design to improve education and learning

Type of educational contextual dimension
- Differentiation of learning materials and procedures
- Integration by and use of ICT support
- Strategies to improve development and learning

Combination with four learning aspects
- Diagnostic, instructional, managerial, systemic

Model of “contextual learning guidelines”

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<thead>
<tr>
<th>Learning aspect</th>
<th>Diagnostic</th>
<th>Instructional</th>
<th>Instructional</th>
<th>Managerial</th>
<th>Systemic</th>
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<td>ICT support</td>
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<td>Improv. strat.</td>
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Contextual learning model (1)

- Diagnostic 1. Identify a pedagogical-didactic kernel structure for competence (sub)domains
- Instruction 2. Structure domains of competence in terms of subskills and instructional lines
- Management 4. Organise and match flexible groups of learners and teachers/coaches
- Systemic 5. Use integrated systems for monitoring, evaluation, and administration

Contextual learning model (2)

- Diagnostic 1. Facilitate construction and use of a pedagogical-didactic kernel structure (PDKS)
- Instruction 2. Enhance structuring, transparency, and flexible use of instructional lines
- Management 4. Encourage differentiated and multilevel evaluation of learning
- Systemic 5. Integrate instruction and learning across different contexts, levels, and points in time

Contextual learning model (3)

- Diagnostic 1. Use a learner’s entry characteristics to stipulate instructional lines
- Instruction 2. Create and control pro-social relationships in and around school
- Management 4. Concentrate teacher coaching on those pupils most in need of this
- Systemic 5. Apply multilevel indicators to improve instruction and learning
Hypothesis
Gifted pupils learning according to systemic contextual learning conditions will do better than gifted pupils in traditional education, in particular because the self-regulatory capacities of gifted pupils can be used more, and better, in the improved systemic conditions.

3. Method
Goal: realise guidelines ‘contextual learning model’
- Development of prototype PDKS
- Development of prototype software
- Pilots in pre-school / primary school
- Collaborative research and development in practice
- Experimental longitudinal research

4. Results
Pedagogical-Didactic Kernel Structure
Competency domains: skill-views:
- language
- general - cognitive
- social - emotional
- arithmetic / mathematics
- physical - medical
- general - psychological
- motor
Implementation: practice examples

Pre-school and primary education

- collaboration with pre-/primary school teachers
- screening of entry characteristics of four-year olds
- experiences in practice:
  - collaboration between parents and teachers
  - multi-perspective communication about competence levels
  - introduction of other types of play and learning materials
  - further specific educational support in small groups
Age-independent collaboration between pupils

1. School level / throughout school
   - curriculum: PDKS-related
   - learning tasks: criterion-based competencies / free
   - general social-emotional and behavioural rules

2. Small group level / collaboration
   - teacher: instructs, coaches, checks requirements
   - pupil chooses other pupil(s)

3. Pupil level
   - placement of pupil at own levels of competence
   - tasks: self-chosen or assigned, individual progress

5. Discussion

1. Model of contextual learning guidelines seems adequate
2. Intense innovation processes in pre-school practice
3. Cases of individual high ability pupils and motivation effects
4. Further systemic educational and ICT-development in collaboration with teachers
5. Longitudinal experimental research

Some references


