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北海道大学 Collection of Scholarly and Academic Papers : HUSCAP
第13回北海道大学－ソウル大学ジョイントシンポジウム分科会と
招待講演　－理科教員養成の日韓比較研究とフィンランド・ヘルシンキ大学
の中等教員養成課程－

大野 栄三

北海道大学は、ソウル大学（Seoul National University）とのジョイントシンポジウムを毎年開催している。2010年の第13回は北海道大学が会場となり、多くの分科会が開かれた。筆者は、2年前からソウル大学のJunehee Yoo准教授（College of Education, Department of Physics Education）とともに、毎年、分科会を組織してきた。今回は学術振興会・二国間交流事業の援助を受け、韓国 NRF との共同セミナーとして、期間と規模を拡大して開催した。共同セミナーは、「フォーマル及びインフォーマルな教育環境における理科教員養成の日韓比較研究」をテーマに、11月4、5日の2日にわたって開催された。日韓の比較研究として準備を始めたが、フィンランドのヘルシンキ大学、台湾の台湾師範大学（National Taiwan Normal University）からの参加があり、国際的な広がりをもったセミナーとなった。紅葉が美しいキャンパスで、二日間、セミナールームに詰まり、濃密な議論をなごやかな雰囲気で行うことができた。共同セミナーのねらい、スケジュールと発表内容、共同セミナーで知ることのできた各国の動向の一部分については、本稿末尾に資料1、2に掲載している。

通常の理科授業を受けている特別な教育配慮が必要（special education need）な生徒の学習について、中学校を事例とした研究報告（Session 1: presentation3）があった。インクルージョン教育は日本では議論が始まったばかりと言ってもよいだろう。韓国では、フルタイムのインクルージョン教育を受けている生徒の数は12,006人（学級数は10,905）である。学校教育の歴史や文化に違いがあるため単純に比較することはできないが、日韓の教師は、特別な配慮が必要な生徒に何をすべきか、彼らのために設定した目標が達成されたのかをどのように判断すればよいのかなど、共通する不安や悩みを持っている。これからの教員養成では、免許取得教科にかかわらず、上述のような課題について学べるようにすべきである。

共同セミナー終了後、11月6日にセミナー整理会を開催し、フィンランドから参加のJari Lavonen教授（University of Helsinki, Department of Teacher Education）に招待講演をお願いした。ヘルシンキ大学の中等教育教員養成について、そのカリキュラムの詳細や特別な教育的配慮を必要とする子どもたちへの対応を講演してもらった。招待講演で使用されたプレゼンテーション・スライドの一部を、本稿末尾に資料3として掲載している。

フィンランドでは、人口密度の低い地域に、複式学級の小規模学校が多くある。そのような学校では、教師自らが判断し、学校教育をつくり、実践していかねばならない。教員養成では、自立した、研究能力をもった人材を育てることが重視されている。ヘルシンキ大学の中等教員養成コースは、まず入口で希望者の10%を選抜するという狭き門で、優秀な学生を選び、理工系の専門教育や大学附属学校での教育実習も含めて5年間の修士レベル
Session I: Analyzing School Science Lessons and Improving Instructions

Theme of this session is to compare the methods for analyzing science lessons. The comparative studies progressed by videotaping science lessons, having interviews with science teachers, getting textbooks and instructional materials in Korea and Japan.

Discussion in Session I: We focus on making-up lessons by science teachers in both countries. We discuss about distinguished lessons, for example, using ICT and individually-targeted instructions for retarded students. We also take notice of effective instructions for small-group activities in some inclusive lessons. Also, in order to understand linguistic characteristics of texts in science textbooks in various levels and science magazines, the texts will be analyzed in terms of Systemic Functional Linguistics.

Session II: Pre-service and In-service Teacher education

There are two themes of this session. The first is to compare education programs for the science teacher’s reeducation at the level of the graduate school in Korea and Japan. And the second is to reconsider the teacher education program based on the survey about opinions of young, incoming science teachers.

Discussion in Session II: We discuss about an extension of the teacher education program to 6 years. We consider worthwhile programs for students, or future teachers at the level of the postgraduate school. The science teachers’ reeducation is also an important issue. We compare programs for in-service science teachers in Korea and Japan. The Japanese team surveys the opinions of Japanese young and incoming teachers. We discuss about the teacher education program based on the survey. Korean team gives presentations about issues in six year teacher training courses including some implications from critical views on constructivism and how to implant cutting edge science into teacher professional development courses.

Session III: Informal Science Education in Korea and Japan

The theme of this session is to compare the informal science education in Korea and Japan. The informal science education uses museums and science pavilions.

Discussion in Session III: We discuss about the situations in Korea and Japan that the informal science education has various meanings according to context. Japanese team
gives a talk on the activities in the university museum, and a presentation of making brochures and pamphlets for effective informal science education in museums and science pavilions. Korean team gives presentations in science learning of visitors in free visits, using question cards and docent guidance contexts in science museums and visitors' understanding on exhibition materials.

共同セミナーのタイムテーブル（11月 4, 5日）

Thursday, 4 November, 2010

Session I: Analyzing School Science Lessons and Improving Instructions

Presentation1 9:10am – 9:40am
Linguistic Analysis of Science Lessons and Improving Instructions  Eizo Ohno (Hokkaido University)

Presentation2 9:40am – 10:10am
Understanding Science Language and Science Writing in Various Contexts  Chan-Jong Kim, Hyun-Jung Cha (Seoul National University)

Presentation3 10:10am – 10:40am
Analysis of learning activities of mentally retarded students in inclusive classes  Junhee Yoo, Sang Kyung Chang, Sung Eun Lee (Seoul National University)

Presentation4 10:50am – 11:20am
Analysis of Science Lesson through Group Discussion at Junior High School  Hatsuo Mitsuishi (Tokyo Gakugei University)

Presentation5 11:20am – 11:50am
New Technology to Meet Students' Learning Needs—A Future Smart University Classroom in Taiwan—  Chun-Yen Chang (National Taiwan Normal University)

Dean’s speech 1:20pm – 1:50pm
Shin-ichi Tokoro (Hokkaido University)

Presentation6 1:50pm – 2:20pm
The Trends of science education in secondary schools in Finland  Jari Lavonen (University of Helsinki)

Discussion 2:20pm – 2:50pm
Discussant: Minoru Tanaka (Hokkaido University of Education)

Session II (Part I): Pre-service and In-service Teacher education

Presentation1 2:30pm – 3:00pm
Cultural Interpretation of Teaching in a Korean Science Education Lesson: “Optimization of Behavior of Teaching in Everyday Lesson Interaction”  Youngdal Cho (Seoul National University)

Presentation2 3:00pm – 3:30pm
Science Teacher’s improvement in Graduate School of Education: Kyoshoku Daigakuin  Kyoko Ishii (Fukui University)

Presentation3 3:30pm – 4:00pm
A case study of the Professional development of science teachers through RET program  Heui-Baik Kim, In Young Baik (Seoul National University)

Presentation4 4:10pm – 4:40pm
Distinguished Science Teacher Training Project  Fumiko Okiharu (Niigata University)
Friday, 5 November, 2010

Session II (Part II): Pre-service and In-service Teacher education

Presentation 5 4:40pm – 5:10pm
Recent change on the teacher education in Taiwan
Chen-yung Lin (National Taiwan Normal University)

Presentation 6 5:10pm – 5:40pm
Teacher Education based on Survey of Young and Incoming Teachers’ Opinions
Tetsuo Umetsu (Hokkaido University)

Reception 7:00pm – 9:00pm

Session III: Informal Science Education in Korea and Japan

Presentation 1 2:50pm – 3:20pm
Science Communication and Informal Education in Science Centers—A Case Study on Sapporo Science Center
Gensei Ishimura, Yukari Furuta, and Tae Toba (Hokkaido University)

Presentation 2 3:20pm – 3:50pm
Understanding Informal Earth Science Learning with Socio-Cultural Lens in Natural History Museums
Chan-Jong Kim, Eun-Ji Park (Seoul National University)

Presentation 3 4:00pm – 4:30pm
Challenges of University Museums as One of Free-choice Science Learning Settings —Educational Activities in the Hokkaido University Museum
Makiko Yuasa (Hokkaido University)

Presentation 4 4:30pm – 5:00pm
Visitors’ understanding on exhibition materials about Tesla Coil at Gwacheon National Science Museum
Junehee Yoo, Il Lee, Jeongwoo Park, Nayoung Lee* (Seoul National University, *Kwanghee Middle School)

Discussion 5:00pm – 5:40pm
The special education needs in Korea is reported in this seminar. The number of full time inclusive students is 12,006 and the number of full time inclusive classes is 10,905 in Korea. It is mistake to compare those numbers between Korea and Japan, without taking into account the each historical background of school education. The inclusive education in Japan has just begun. Science teachers in both countries are, however, confronted with the same difficulties. Science teachers don’t know what to do for special education need students or to include special education need students in their classes, and how they can know any cognitive improvement of special education need students in inclusive classes. The analysis of science lessons in the inclusive class in Korea is impressive.

Teachers should understand students’ circumstances and communicate with each student appropriately. The two presentations in Session I focus on linguistic features of science education. Language is a major barrier to most students in learning science lessons. In Korea, the way to use the language of science in science education is investigated. Systemic Functional Linguistics is used for analyzing the linguistic features of science writings.

In case of teacher education, bridging the gap between cutting edge science and science education, teacher collaborations, optimization teaching behaviors are emerging topics in Korea. For informal science education, socio-cultural lenses are useful methods, and specific topic such as using queesting cards, understandings in labels are approached.

In Finland, the school-based curriculum is constructed locally based on the national guideline. The separate science subjects are taught by highly specialized subject teachers at lower secondary school. The goals and contents for science education fit well with the OECD scientific literacy. Teachers are responsible for selection of teaching and learning materials published by independent houses. There was a lot of practical work in a science lesson, but the number of class debate activities is lower than the OECD average. According to the national survey in Finland, students wish that their ideas are used by teachers, and small group discussion in classroom.

A Finnish teacher should be an autonomous professional and have research orientation, reflective thinking skills. The secondary teacher education program is working and there is a balance supporting the development of general pedagogical knowledge and pedagogical content knowledge. However, according to the survey of students’ feedback, the research seminar gets lower evaluations. It is required to motivate students in their producing of educational research.

Since the normal education act in 1994, two of three normal universities for training secondary school teachers changed their names to the ones without “normal”. Nine normal colleges for training elementary school teachers are renamed or merged with neighboring universities. The teacher education act in 1994 allows comprehensive universities to offer teacher education programs. The number of teachers in preparation increased from about 9,707 in 1995 to 20,274 in 2004, and decreased to 8,825 in 2010. The policy of teacher education has been influenced by the low birth rate and excess of teachers in Taiwan.
Teacher Education in Finland: Knowledge Building in the Chemistry and Physics Teacher Education Programme at Helsinki University

13th Hokkaido University – Seoul National University Joint Symposium: Comparative Study of Science Teacher Education at Formal and Informal Educational Settings in Korea and Japan
4 – 5 November, 2010

Jari Lavonen
Professor of Physics and Chemistry Education,
Head of the department
Department of Teacher Education,
University of Helsinki, Finland

Questions:
- What is the structure of the Finnish secondary teacher education programme and how it is constructed (view to special need education)?
- What kind of support the pedagogical studies in Finland offers to the construction of teacher knowledge from the point of view of-
  - structure of the knowledge
  - origin of the knowledge
- How do Finnish student teachers evaluate the courses of the pedagogical studies from the point of view of the support to the construction of teacher knowledge?

Main cornerstones of the education policy
(could be found in policy documents and publications,
Halinen (2008); Jakku-Sihvonen & Niemi (2006); Laukkanen (2008))

1. Common, consistent and long-term policy
   - basic models for teacher education and compulsory education are 40 years old
   - support to the development of broad literacy
2. Educational equality
   - compulsory education free of charge to all, including books, meals, transport and health care
   - well-organized special education
3. Devolution of decision power to the local level
   - a headmaster is a pedagogical director
   - local authorities (together with the teachers) plan local curriculum, organise general assessment and use this data for evaluating the schools and for allocation of resources.
4. The culture of trust
   - no inspectors, no national exams …
   - no private tutoring or gram schools

Country percentile scores compared to the OECD average percentile scores in PISA 2006 science scale

Structure of Finnish Education

Finnish educational context
Questions:

- What is the structure of the Finnish secondary teacher education programme and how it is constructed?
- What kind of support the pedagogical studies in Finland offers to the construction of teacher knowledge from the point of view of - structure of the knowledge - origin of the knowledge
- How do Finnish student teachers evaluate the courses of the pedagogical studies from the point of view of the support to the construction of teacher knowledge?

A subject/secondary teacher
- typically teaches at grades 7 to 12 (ages 13 to 19)
- teaches typically one major and one minor subjects (e.g. math and physics)

A primary/elementary school teacher
- teaches at grades 1 to 6 (ages 7 to 13)
- teaches typically all 13 subjects

Structure of the Master's degree of a subject teacher: 3 + 2 years, 300 cr

- Bachelor's level (180 cr) Master's level (120 cr)
- Study credits
- Teacher's benefit of the research orientation while they make the subject and pedagogical knowledge about teaching and learning, science education and school practice are integrated into the students' own personal pedagogical theory when they guide students' learning and problem-solving
- Study credits or 26 hours of work
- Major Subject Minor Subject Pedagogical studies Communication and language studies

Structure of the master degree of a primary teacher: 3 + 2 years

- Bachelor's level (180 cr) Master's level (120 cr)
- Study credits
- Teaching practice Pedagogical studies
- Study credits or 26 hours of work
- Major Subject Education subsidiary subject studies Minor Subject(s) Communication and language studies

Teacher education at the University of Helsinki

University of Helsinki (11 faculties, 38,000 students, 7,400 staff members)

- Dept. of Teacher Education Teacher Training Schools
- Subject teacher education: pedagogical studies + subject studies

Programs are free for students
There are heavy selection procedures! -> a job for everybody
Aims of the pedagogical studies are to help the students …

- to **integrate** subject knowledge, knowledge about teaching and learning and school practice into their own personal pedagogical theory.
- to become **aware** of the different dimensions of the teacher profession: social, philosophical, psychological, sociological, and historical basis of education,
- to be able to **reflect** on their own personal pedagogical “theory” (reflection for, in and on action),
- to **develop potentials** for lifelong professional development.

Content of the pedagogical studies in the Subject teacher education programme: 60 ECTS credits equal to one study year

- **Education** (20 %)
  - Psychology of development and learning
  - Special needs education
  - Social, historical and philosophic grounds
- **Subject pedagogy/didactics/PCK** (50 %)
  - Curriculum development and planning of teaching, psychological basis of teaching and learning a subject
  - Evaluation of teaching and learning
  - Educational research and pedagogical thesis
- **Teaching practice** (30 %)

Psychology of development and learning, 4 cp

Objectives:
- A student becomes familiar with development of an individual and group and identifies the special characteristics of the different groups.
- The student develops readiness to understand different views on the growth, development and learning of the human being and from the significance of the interaction between an individual and a group and takes the psychologic principles of the learning into consideration in the teaching.

Special needs education, 4 cp

Objectives: A student
- knows the basic concepts and structures of the special education,
- learn to operate as a part of the other professionals supporting students growth and behaviour, and
- learn to identify different needs of the pupils’ and their learning difficulties.
- The student develops readiness for the understanding of the significance of the different pedagogic solutions.

Curriculum development and planning of teaching; Psychological basis related to teaching and learning a subject (PCK), 10 cp

Objectives:
- The student teachers learn to design teaching and learning by taking into consideration
  - the national and local curriculum,
  - the research based knowledge about teaching and learning a subject,
- The student develops readiness
  - to examine the school as an learning environment,
  - to understand the basic values of education,
  - to use versatile teaching methods and ICT,
  - to analyse social situations at schools and
  - to analyse development of his/her own teacher profession.

Framework for designing and implementing the teacher education programme at the University of Helsinki

Research on teacher education
- Structure of teacher knowledge
- Forms of knowledge: professional … practical

Research on subject and research on teaching and learning
- Content

EU and National strategies
- ICT
- Special education

Student learning and evaluations of the programme

Co-operative planning of the programme: Teachers from the subject departments, Department of teacher education, school teachers and the student teachers

Subject teacher education programme
Teacher Education Development Programme (2002): The teacher education programmes should help students to acquire:

- high-level subject knowledge and pedagogical content knowledge, and knowledge about nature of knowledge, ...
- academic skills, like research skills; skills needed in developing a curricula, ...
- social skills, like communication skills; skill to co-operate with other teachers, ...
- knowledge about school as an institute and its connections to the society (school community and partners, local contexts and stakeholders),
- moral knowledge and skills, like social and moral code of the teaching profession,
- skills needed in developing one’s own teaching and the teaching profession.

Special education in Finland

by Nina Sajaniemi

- 47,000 children (8.5 per cent) with special education needs. From these 47,000 children:
  - 53 per cent are integrated into normal classes:
    - Whole integration: 29 per cent
    - Partial integration: 24 per cent (learning in a special education class, but attending to mainstreaming classes in some topics (music, sports, home economics, ...)
  - 33 per cent are attending special education classes (max. 10 pupils), located in mainstream schools
  - 14 per cent are in special schools
- An Individual Education Plan (=HOJKS) for each pupil entitled to special education.

32 pupils at 3rd grade science class
4 special need pupils integrated to the "ordinary classroom"

An introduction of a topic through a whiteboard activity.

A teacher is supporting and encouraging a special need student.

Let's have a look where we are now. It is time for discussion.
Use of the learning materials (handbooks, textbooks, workbooks, web-based environments,…) support integration of pupils

In the previous slides, an example of a part time special education within a mainstream school

- Children with mild learning difficulties (e.g. dyslexia, learning difficulties in mathematics and/or in foreign languages, dysfunctions in attention)
- (2) socio-emotional difficulties or
- (3) behavioural difficulties are integrated to ordinary classrooms through special support
- Support is organized individually, in small groups or simultaneously in the classroom: Classroom teacher and special education teacher work as a team

If part time special education is NOT ENOUGH

- Individualized curriculum (one subject … all subjects): partly in a special class, partly in a mainstream class.
- Individualized tutoring: a school assistant works as a part of the supportive system
- Home-schooling, individually or in small groups.
- Integrated pupils get additional teaching support (2 hours/week).

Special schools and special classes:

- Special schools for children with major problems in development
- Brain damage, mental retardation, visual and hearing defects,
- Children with dysfunctions in multiple areas of development are referred to special classes
- Autism, Asperger syndrom, mild mental retardation
- But – the trend is toward whole integration and inclusion

School welfare group

Members:
- The School Principal, the chair of the group
- The School Psychologist
- The School Nurse
- The Special Teacher

Temporary members:
- The Class teacher / Subject teacher
- The Social worker
- The Student advisor

Tasks:
- Follows, plans, organizes, evaluates → hope for prevention
- Meetings 2-4 times/month.
- During the school year discusses about the situation with every class teacher (= all the pupils).
- Main target: the physical and psychological well-being of pupils

The process of the co-operation and consultation when (learning) difficulties: Early Identification and Early Intervention

- Teachers or the parents identify the problems of a child (or the child, when older).
- Consultation of the special education teacher.
- Special education teacher assess the learning environment and the child’s individual needs.
- Extra support in class or special education individually or in a group.
- School’s welfare group / confidential multi-professional work.
- Psychological tests and evaluation.
- The test results are reported to the pupil and the parents
- School meeting with the parents and teachers
- Individual Learning Plan (ILP) (special materials, therapies…)
- Continuity: School welfare group follow-up and consultation
How to proceed further on….

- Individual Learning Plan
- Tutoring (given by the class teacher)
- Special Education (given by the Special Education Teacher)
- Special class
- School assistant
- Private education in school or at home
- Surveys made in the classroom (working climate, bullying, etc.)
- Co-operation in the room. Interventions and projects.
- Individual and group discussions
- Sending the pupil to further examines or treatment
- Co-operation with the Regional Social Centre
- Co-operation with parents

Teacher knowledge and origins of teacher knowledge

Teacher knowledge domains form a starting-point for characterising ‘a professional teacher’ (Carlsen, 1999)

- The structural perspective is based on different domains of the teacher knowledge, such as
  - Subject matter knowledge,
  - Pedagogical Content Knowledge (PCK) and
  - General Pedagogical Knowledge (GPK)
  (Shulman, 1987; Carlsen, 1999; Hashweh, 2005)

  + Knowledge about how to produce and consume research based knowledge in education (RES)

Academic General pedagogical knowledge (GPK) ↔ Teachers personal pedagogical knowledge

- Research based General pedagogical knowledge (GPK) consists of
  1) classroom management and organisation
  2) instructional models and strategies
  3) classroom communication

- Teachers personal pedagogical knowledge is divided into
  1) personal beliefs,
  2) personal practical experience

Pedagogical content knowledge (PCK)

- PCK is a knowledge domain that is synthesis of all knowledge needed for teaching and learning a specific content
- PCK is
  - content specific,
  - event- and story-based, and
  - personal in the sense that the teacher has developed over time through repeated planning and teaching and reflection on the teaching of the most regularly taught topics.

Second perspective to teacher knowledge: origin of knowledge (forms) perspective

- From the point of view of origins of knowledge, the knowledge could come from (Hebert et al., 2002):
- practice
  - experience (Dewey, 1938)
  - practice with feedback (Gagne, 1985)
  - failure (Schank, 1989)
  - reflective practice (Ericsson, 2001)
- professional (theoretical) sources of information
  - academic books
  - lectures
  - workshops
  - own research
  - Combination

Importance of interplay between GPK and personal pedagogical knowledge through reflection
Empirical part of the study

Questions:
- What is the structure of the Finnish secondary teacher education programme and how it is constructed?
- What kind of support the pedagogical studies in Finland offers to the construction of teacher knowledge from the point of view of:
  - structure of the knowledge
  - origin of the knowledge
- How do Finnish student teachers evaluate the courses of the pedagogical studies from the point of view of the support to the construction of teacher knowledge?

Content Analysis of the Pedagogical Studies

- Content analysis started with the domains and origins of teacher knowledge (derived from research literature):
  - Teacher knowledge domains:
    - General Pedagogical Knowledge (GPK);
    - Pedagogical Content Knowledge (PCK);
    - Educational research (RES)
  - Origin of teacher knowledge:
    - Professional (Theoretical) knowledge (Prof);
    - Practical knowledge (Prac)
  - However, it is a challenge to analyse the courses
  - Support to PCK and GPK construction is included in several courses
  - Practical knowledge is not only constructed in teaching practice but also during the theoretical
  - Theory is applied in teaching practice (justification of pedagogical decisions in the classroom)
  - Reflection is kind of “research-making” (systematic observation – description of it – analysis – explanation).

The structure of the pedagogical studies in subject teacher education programme in Finland

<table>
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<tr>
<th>Pedagogical studies Finland (60 cp.)</th>
<th>Subject pedagogy (PCK) 17 cp</th>
<th>Educational research 10 cp</th>
<th>Teaching practice 20 cp</th>
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<tr>
<td>General courses on education, teaching and learning 13 cp</td>
<td>Psychological basis of teaching and learning of a subject 5 cp</td>
<td>- Research methodology in education 3 cp</td>
<td>- Supervised basic teaching practice 7 cp</td>
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<tr>
<td>Subject pedagogy (PCK) 17 cp</td>
<td>Curriculum development and planning of teaching 5 cp</td>
<td>- Teacher as a researcher 3 cp</td>
<td>- Supervised applied teaching practice 5 cp</td>
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<tr>
<td>Educational research 10 cp</td>
<td>- Evaluation of teaching and learning (evaluation of a curriculum 7 cp)</td>
<td>- Minor thesis in pedagogy 4 cp</td>
<td>- Supervised advanced teaching practice 8 cp</td>
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<td>Teaching practice 20 cp</td>
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<td>- Reflection supported by portfolio assessment work</td>
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In Finland huge amount of PCK is taught also at the departments of Physics, Chemistry...
Number of single aims, recognised based on the analysis of course descriptions

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<td>Special needs education</td>
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<td>Reflection</td>
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Questions:

- What is the structure of the Finnish secondary teacher education programme and how it is constructed?

- What kind of support the pedagogical studies in Finland offers to the construction of teacher knowledge from the point of view of:
  - structure of the knowledge
  - origin of the knowledge

- How do Finnish student teachers evaluate the courses of the pedagogical studies from the point of view of the support to the construction of teacher knowledge?

Questionnaire and questionnaire data analysis

- Data was gathered by questionnaires in three years: $N_{2004-2005} = 51; N_{2005-2006} = 75; N_{2006-2007} = 80$
- 70% to 80% of the students answered the questionnaires.
- Physics & chemistry student teachers’ median age 26
- The questionnaires were similar in each year (several open and closed questions about the pedagogical studies)
  - Five-point Likert scale
    - (1 = significance small … 5 = significance big)
    - for evaluating the value of each course from the viewpoint of support to construction of teacher knowledge
  - One question focusing on students’ opinions about the research orientation of pedagogical studies
  - Qualitative content analysis of the answers to open questions

Output of the qualitative analysis: Psychology of development and learning

- About 13% of the students described in a positive way and only 7% in a negative way how the course “Psychology of development and learning” supported knowledge construction.
  - Positive comment: “The issues discussed during the course were interesting”
  - Negative comment: “Since I am becoming a secondary teacher, knowledge about the development of a small child is not necessary information for me”
- Only 5% of the students wrote comments which can be linked to the origin of the knowledge.

Students evaluations of the program: Value for development of teacher knowledge

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<tr>
<td>Education: mainly GPK</td>
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<td>Psychology of development and learning</td>
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<td>Special needs education</td>
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<td>Social, historical, and phil. basis of education</td>
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<td>Curriculum development and evaluation of teaching and learning</td>
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<td>Research methodology and teacher as a researcher-seminar</td>
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<td>Pedagogy: psychological basis related to teaching and learning science (10 cp.)</td>
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<td>Pedagogy: curriculum development and planning of teaching (7 cp.)</td>
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<td>Pedagogy: Research Methodology and making of pedagogical research (10 cp.)</td>
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<td>Teaching practice: Basic Teaching Practice in a Teacher Training School (7 cp.)</td>
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<td>Teaching practice: Learning from practice through reflective thinking</td>
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Significance of a course small for development of a teacher knowledge

Significance of a course big for development of a teacher knowledge

Output of the qualitative analysis: Psychology of development and learning

- Only 5% of the students wrote comments which can be linked to the origin of the knowledge.
Output of the qualitative analysis:
Teaching practice

Positive comment:
- “The Basic Teaching Practice was the most important period during the autumn term.”
- “My own lessons and the lessons of other students opened my eyes to the reality of the school.”
- “Learning by doing is the best.”

Negative comment:
- “The topics of the ‘school as a community-seminar’ should be more practical, for example, focusing on the behaviour of students.”
- “Reflection is ok – but why does one have to write everything down?”

Qualitative evaluations of the courses

Output of the qualitative analysis:
Research orientation

More than 50 % of the students agree or strongly agree:
- research orientation of the teacher education programme is very important for becoming a teacher.

Output of the qualitative analysis:
Research orientation and reflection, 1

The meaning of educational concepts
- conceptualisation of phenomena that are central is acquired through literature.
- It is not possible to learn a teaching profession through lecturing but through practice.

Output of the qualitative analysis:
Research orientation and reflection, 2

The meaning of reflection and justification of decisions based on research
- Reflection is ok – but why does one have to write everything down
- What is the purpose of completing the portfolio?

Output of the qualitative analysis:
Research orientation and reflection, 3

The meaning of producing a small scale research
- Science education orientation is important in research seminar.
- It is a way to reach teacher autonomy.
- Competence in conducting research is not so important.
Discussion and conclusions

Domains of Teacher knowledge

Student teachers evaluated the courses in a similar way from the point of view of becoming a physics/chemistry teacher:

- There is a balance among the courses supporting the development of GPK and PCK
- The programme is working

Teaching practice and reflection

- According to the student feedback, teaching practice is evaluated very highly compared to other courses
  - It is practical, hands-on type of work
  - High quality supervision
  - It helps the students to combine research-based knowledge and practice.
- Reflective thinking skills are essential for become reflective and autonomous professionals. However, new forms/models should be (and are already) developed.
- According to the student feedback, teaching practice is evaluated very highly compared to other courses
  - It is practical, hands-on type of work
  - High quality supervision
  - It helps the students to combine research-based knowledge and practice.

Research orientation

- Research seminar gets lower evaluations: A challenge to motivate the students in their own research (producing of educational research).
- A Finnish teacher needs research orientation when he or she is developing local level curriculum or participating teachers in-service training.
- Differences between producer and consumer of the pedagogical research should be discussed more while planning the programme?

A need to develop instruction in teacher education

- Awareness of epistemological assumptions underlying the teacher education programme
  - not considering only structure of the programme and but also the origin of knowledge when designing the programme
- Support to student teachers active role in knowledge construction and reflection through offering and combining theoretical knowledge (e.g. learning psychology)
  - individual experiences/ knowledge created in practice
- Facilitating and use of appropriate tools in the process