RC-Specific Evaluation of RCMSER – Research Community for Mathematics and Science Education Research

Seppo Saari & Antti Moilanen (Eds.)
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

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Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate. Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs. Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report.

Chapters in the report:
1. Background for the evaluation
2. Evaluation feedback for the Researcher Community
3. List of publications
4. List of activities
5. Bibliometric analyses

The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.

RC-specific information:

**Main scientific field of research:** Social Sciences

**Participation category:** 4. Research of the participating community represents an innovative opening

**RC’s responsible person:** Lavonen, Jari

**RC-specific keywords:** mathematics education, physics education, chemistry education, teacher education, teaching and learning, nature of knowledge

**Keywords:** Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community
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Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (PIs). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the “bottom up” and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which lead to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs’ answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.
On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation
Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair
Vice-Rector, professor Johanna Björkroth

Vice-Chair
Professor Marja Airaksinen
Chief Information Specialist, Dr Maria Forsman
Professor Arto Mustajoki
University Lecturer, Dr Kirsi Pyhältö
Director of Strategic Planning and Development, Dr Ossi Tuomi
Doctoral candidate, MSocSc Jussi Vauhkonen
Panel members

CHAIR
Professor Hebe Vessuri
Social anthropology
Venezuelan Institute of Scientific Research, Venezuela

VICE-CHAIR
Professor Christine Helm
Psychology, neurobiology of early-life stress, depression, anxiety, functional somatic disorders
Charité University Medicine Berlin, Germany

Professor Allen Ketcham
Ethics and social philosophy, applied Social philosophy, ethics of business
Texas A&M University – Kingsville, USA

Professor Erno Lehtinen
Education, educational reform
University of Turku, Finland

Professor Enzo Mingione
Urban sociology
University of Milan - Bicocca, Italy

Professor Giovanna Procacci
Political sociology, transformation of citizenship, social rights, social exclusion, immigration policy
University of Milan, Italy

Professor Inger Johanne Sand
Law, public law, legal theory
University of Oslo, Norway

Professor Timo Teräsvirta
Time series econometrics
Aarhus University, Denmark

Professor Göran Therborn
General sociology
University of Cambridge, Great Britain

Professor Liisa Uusitalo
Consumer behaviour (economic & social theory), marketing and communication research
Aalto University, School of Economics, Finland

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by two members from the Panel of Humanities.

Experts from the Panel of Humanities
Professor Erhard Hinrichs
Professor Pauline von Bonsdorff
EVALUATION OFFICE
Dr Seppo Saari, Doc., Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, Doc., Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Molianen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE
Provision of the publication and other scientific activity data
Mrs Alja Kaltera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebom, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY
Provision of the publication analyses
Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.
Acronyms and abbreviations applied in the report

External competitive funding
AF – Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks
Outstanding (5)
Excellent (4)
Very Good (3)
Good (2)
Sufficient (1)

Abbreviations of Bibliometric Indicators
P - Number of publications
TCS – Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS – Thomson Reuters Web of Science Databases

Participation category
Category 1. The research of the participating community represents the international cutting edge in its field.
Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.
Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.
Category 4. The research of the participating community represents an innovative opening.
Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki
Focus area 1: The basic structure, materials and natural resources of the physical world
Focus area 2: The basic structure of life
Focus area 3: The changing environment – clean water
Focus area 4: The thinking and learning human being
Focus area 5: Welfare and safety
Focus area 6: Clinical research
Focus area 7: Precise reasoning
Focus area 8: Language and culture
Focus area 9: Social justice
Focus area 10: Globalisation and social change
1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation\(^1\) and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University’s strategic policies. The improvement of doctoral training should be compared to the University’s policy.\(^2\)
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University’s research potential.
- to exploit the University’s TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

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\(^1\) The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.

\(^2\) Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.
The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

**Five stages of the evaluation method were:**

1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT\(^3\) compilations on publications and other scientific activities\(^4\)
4. External evaluation
5. Public reporting

**1.4 Implementation of the external evaluation**

**Five Evaluation Panels**

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:

1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:

- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

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\(^3\) TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

\(^4\) Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.
1.5 Evaluation material

The main material in the evaluation was the RCs’ self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material
1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
   3.1. statistics of publications
   3.2. list of publications
   3.3. statistics of other scientific activities
   3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
   4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
   4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki
- Basic information about the University of the Helsinki
- The structure of doctoral training at the University of Helsinki
- Previous evaluations of research at the University of Helsinki – links to the reports: 1998 and 2005

The Finnish Universities/Research Institutes
- Finnish University system
- Evaluation of the Finnish National Innovation System
- The State and Quality of Scientific Research in Finland, Publication of the Academy of Finland 9/09.

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.
1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the additional material as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. **Focus and quality of the RC’s research**
   - Description of
     - the RC’s research focus.
     - the quality of the RC’s research (incl. key research questions and results)
     - the scientific significance of the RC’s research in the research field(s)
   - Identification of the ways to strengthen the focus and improve the quality of the RC’s research

The additional material: TUHAT compilation of the RC’s publications, analysis of the RC’s publications data (provided by University of Leiden and the Helsinki University Library)

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. **Practises and quality of doctoral training**
   - Organising of the doctoral training in the RC. Description of the RC’s principles for:
     - recruitment and selection of doctoral candidates
     - supervision of doctoral candidates
     - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
     - good practises and quality assurance in doctoral training
   - Identification of the RC’s strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC’s other scientific activities/supervision of doctoral dissertations

A written feedback from the aspects of: processes and good practices related to leadership and management
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. **The societal impact of research and doctoral training**
   - Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
   - Identification of the ways to strengthen the societal impact of the RC’s research and doctoral training.

The additional material: TUHAT compilation of the RC’s other scientific activities.

A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)
4. International and national (incl. intersectoral) research collaboration and researcher mobility
   - Description of
     - the RC's research collaborations and joint doctoral training activities
     - how the RC has promoted researcher mobility
   - Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration
   - Strengths
   - Areas of development
   - Other remarks
   - Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. Operational conditions
   - Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).
   - Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management
   - Strengths
   - Areas of development
   - Other remarks
   - Recommendations

6. Leadership and management in the researcher community
   - Description of
     - the execution and processes of leadership in the RC
     - how the management-related responsibilities and roles are distributed in the RC
     - how the leadership- and management-related processes support
       - high quality research
       - collaboration between principal investigators and other researchers in the RC
       - the RC's research focus
       - strengthening of the RC's know-how
   - Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. External competitive funding of the RC
   - The RCs were asked to provide information of such external competitive funding, where:
     - the funding decisions have been made during 1.1.2005-31.12.2010, and
     - the administrator of the funding is/has been the University of Helsinki
   - On the e-form the RCs were asked to provide:
     1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organisations), and
     2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance
   - Strengths
   - Areas of development
   - Other remarks
   - Recommendations

8. The RC's strategic action plan for 2011–2013
   - RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance
   - Strengths
   - Areas of development
9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC’s fitness to the chosen participation category
A written feedback evaluating the RC’s fitness to the chosen participation category
- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material
Comments on the compilation of evaluation material

11. How the UH’s focus areas are presented in the RC’s research?
Comments if applicable

12. RC-specific main recommendations based on the previous questions 1–11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:
- outstanding (5)
- excellent (4)
- very good (3)
- good (2)
- sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, ‘criteria’). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC’S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)
Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of “international attention” or “international impact” etc. in the grading criteria above may be replaced by “international comparability”.
Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

**Excellent quality of procedures and results (4)**

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

**Very good quality of procedures and results (3)**

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

**Good quality of procedures and results (2)**

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

**Sufficient quality of procedures and results (1)**

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

**Question 2 – DOCTORAL TRAINING**

**Question 3 – SOCIETAL IMPACT**

**Question 4 – COLLABORATION**

**Classification: Criteria (level of procedures and results)**

**Outstanding quality of procedures and results (5)**

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

**Excellent quality of procedures and results (4)**

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

**Very good quality of procedures and results (3)**

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and
management are documented and operations and practices are to large extent in alignment with the
documentation. The ambition to develop the community together is of very good quality.

**Good quality of procedures and results (2)**

Procedures are of good quality, shared occasionally in the community. The practices and quality of
doctoral training/societal impact/international and national collaboration/leadership and
management are documented and operations and practices are to large extent in alignment with the
documentation. The ambition to develop the community together is of good quality.

**Sufficient quality of procedures and results (1)**

Procedures are of sufficient quality, transparent and shared in the community. The practices and
quality of doctoral training/societal impact/international and national collaboration/leadership and
management are occasionally documented and operations and practices are to some extent in
alignment with the documentation. The ambition to develop the community together is of sufficient
quality.

**Question 9 – CATEGORY**

Participation category – fitness for the category chosen

The choice and justification for the chosen category below should be reflected in the RC's responses to the
evaluation questions 1–8.

1. *The research of the participating community represents the international cutting edge in its field.*
2. *The research of the participating community is of high quality, but the community in its present
   composition has yet to achieve strong international recognition or a clear break-through.*
3. *The research of the participating community is distinct from mainstream research, and the special
   features of the research tradition in the field must be considered in the evaluation.* The research is
   of high quality and has great significance and impact in its field. However, the generally used
   research evaluation methods do not necessarily shed sufficient light on the merits of the
   research.
4. *The research of the participating community represents an innovative opening.* A new opening can
   be an innovative combination of research fields, or it can be proven to have a special social,
   national or international demand or other significance. Even if the researcher community in its
   present composition has yet to obtain proof of international success, its members can produce
   convincing evidence of the high level of their previous research.
5. *The research of the participating community has a highly significant societal impact.* The
   participating researcher community is able to justify the high social significance of its research.
   The research may relate to national legislation, media visibility or participation in social debate,
   or other activities promoting social development and human welfare. In addition to having
   societal impact, the research must be of a high standard.

**An example of outstanding fitness for category choice (5)**

The RC's representation and argumentation for the chosen category were convincing. The RC recognized
its real capacity and apparent outcomes in a wider context to the research communities. The specific
character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the
category.

- Outstanding (5)
- Excellent (4)
- Very good (3)
- Good (2)
- Sufficient (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in
the positioning of the classification. There was no exact definition for the category fitness.

---

5 The panels discussed the category fitness and made the final conclusions of the interpretation of it.
1.8 Timetable of the evaluation

The main timetable of the evaluation:

1. Registration   November 2010
3. External peer review    May–September 2011
4. Published reports     March–April 2012
   - University level public report
   - RC specific reports

The entire evaluation was implemented during the university’s strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.
2 Evaluation feedback

2.1 Focus and quality of the RC’s research

- Description of
  - the RC’s research focus
  - the quality of the RC’s research (incl. key research questions and results)
  - the scientific significance of the RC’s research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC’s research

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness

RCMSER is a heterogeneous centre, whose participants belong to four different departments of University of Helsinki. There is a discrepancy in the evaluation documents. In the self-evaluation text the RC express that they have published 49 articles in international refereed journals during the period. However, in the publication analysis included in the evaluation material the number of international journal articles is almost 300. The reason for the discrepancy is that in the publication analysis there are all publications of the persons mentioned in the list of the RC members including the researchers from the Department of Physics. Thus more than 200 articles are included which deal with the basic research in physics.

Multidisciplinary collaboration is one of the strength of this RC but in the evaluation of the scientific quality of the group we relied on the information given in the self-evaluation report and excluded the articles which are not at all related to education.

The RC has quite a many publication in the field of mathematics and science education. The RC has been very active in many kind of international projects including several EU projects. Additional indicators of international activity of the RC are the many papers the members of the group have presented in international science and mathematics education conferences. However, our rating of the scientific quality diminish the fact that relatively few articles of the group have been published in high-quality education and science teaching journals.

Efforts to raise the quality of research and subsequent publications in these areas would thus be very welcome. As the self-evaluation report concludes, defining common problems and problem clusters and doing joint work on them would be useful.

Numeric evaluation: 3 (Very good)

2.2 Practises and quality of doctoral training

- Organising of the doctoral training in the RC. Description of the RC’s principles for:
  - recruitment and selection of doctoral candidates
  - supervision of doctoral candidates
  - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
  - good practises and quality assurance in doctoral training
  - assuring of good career perspectives for the doctoral candidates/fresh doctorates
- Identification of the RC’s strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.
- Additional material: TUHAT compilation of the RC’s other scientific activities/supervision of doctoral dissertations

ASPECTS: Processes and good practices related to leadership and management

The graduates students are recruited following ‘the general rules of the University of Helsinki’. It seems that there is no systematic admission procedure with an open competition to find the best candidates.
Given the heterogeneous structure of RCMSER, such a procedure may be difficult to set up, however, but the possibility should be considered. A unifying feature is that the selected students become members of the Finnish Graduate School of Mathematics, Physics and Chemistry Education (FGSMPCE).

It is somewhat unclear how systematic PhD programme there is within FGSMPCE. Nevertheless, concerning the coursework, there is ample collaboration with international graduate schools. Furthermore, there have been joint Nordic courses financed by NordForsk, European Science Education Research Association and European Society for Research in mathematics Education. Annual international meetings of Graduate Schools of Science Education Research from five countries may also be mentioned. It seems that RCMSER has been very active in maintaining international contacts and making use of opportunities for sending students to courses abroad.

Supervision of graduate students has been arranged in a satisfactory way: each student has a principal supervisor and two additional ones. Interaction between departments occurs through joint seminars in which the students and the supervisors take part. As a positive detail it may be mentioned that the students write papers jointly with their supervisors. This has at least three advantages. First, students learn how the write papers, which is a difficult skill to learn alone. Second, they learn to interpret referees’ reports (peer reviews) and how to respond to them when revising the papers. Third, students are integrated into the research community and do work on topics that the supervisors are genuinely interested in.

Career prospects of the graduate students are deemed good. There is no mention, however, about the fact that students receive advice or help in finding a job after finishing their PhDs. Maybe the job market is so good that this is not needed, otherwise organizing this activity could be considered.

Numeric evaluation: 4 (Excellent)

2.3 The societal impact of research and doctoral training

- Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
- Identification of the ways to strengthen the societal impact of the RC’s research and doctoral training.
- Additional material: TUHAT compilation of the RC’s other scientific activities.

ASPECTS: Societal impact, national and international collaboration, innovativeness

The strongest and most obvious societal impact of RCMSER is that after graduation the students serve as science and mathematics teachers in the Finnish school system. The RC also participates (through LUMA) in organizing various kinds of activity for the teachers to help them to maintain and improve their pedagogical skills and those of their subject matter. The best way of increasing the impact is to continuously improve the quality of the PhD programme producing these teachers.

Writing textbooks for schools (more than 100 books in the period 2005-2010) is a substantial activity that directly serves the society.

Numeric evaluation: 4 (Excellent)

2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

- Description of
  - the RC’s research collaborations and joint doctoral training activities
  - how the RC has promoted researcher mobility
- Identification of the RC’s strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

ASPECTS: Scientific quality, national and international collaboration
RCMSER has been particularly active in organizing and taking part in international activities in PhD training. It has received EU funding for numerous research projects that have involved several countries and universities. This collaboration is not yet sufficiently visible in the list of publications of RCMSER, so has to be intensified.

The RC concludes that it has received sufficient funding for research mobility. The international character of the PhD education is an important factor in promoting mobility. However, RCMSER sees a need to establish a more permanent structure for organizing mobility ‘in a more convenient way’. This may require cross-departmental resources to have a ‘mobility officer’ to maintain contacts with foreign partners, help in practical organization of PhD courses and manage funds for research, travel, and course participation.

The number of international students in the PhD programme is not high, partly because the PhD programme’s recruiting focus on Finnish mathematics science teachers. However, the RC could use its international networks to get high level international doctoral students and postdoctoral researchers to work in the group.

Numeric evaluation: 4 (Excellent)

2.5 Operational conditions

- Description of the operational conditions in the RC’s research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC’s strengths and challenges related to operational conditions, and the actions planned for their development.

ASPECTS: Processes and good practices related to leadership and management

Due to the heterogeneous structure of RCMSER, research infrastructure is organised by department, although common ground for joint research is being sought. While three departments have at least one professor specializing in science education, the Department of Mathematics and Statistics have none.

According to the self-evaluation senior members of RCMSER have heavy teaching loads and plenty of administrative duties which leave too little time for research. The University has to look into this.

Most graduate students have no funding and study only part-time, which means inefficient study and is a serious disadvantage. It is frustrating also from the supervisors’ point of view. RCMSER and the University should look into this.

2.6 Leadership and management in the researcher community

- Description of
  - the execution and processes of leadership in the RC
  - how the management-related responsibilities and roles are distributed in the RC
  - how the leadership- and management-related processes support
    - high quality research
    - collaboration between principal investigators and other researchers in the RC
    - the RC’s research focus
    - strengthening of the RC’s know-how
- Identification of the RC’s strengths and challenges related to leadership and management, and the actions planned for developing the processes

ASPECTS: Processes and good practices related to leadership and management

Since RCMSER is a centre comprising researchers from four different departments with different cultures and research traditions, there is no central leader or leadership organization. In some issues, see mobility, more centrality may be very useful. In some other areas, such as research, this may not be necessary.
Coordinating research and finding common research problems can be done rather informally through individual contacts without a formal administrative structure.

A drawback of lack of a central administrative structure is that RCMSER, as opposed to many other RCs, may be seen as a rather diffuse or vague unit, without a strong voice in matters concerning it at the university level. A regular structure (light) of joint centre meetings could be useful in creating more cohesion within the RC and discussing issues of common interest.

2.7 External competitive funding of the RC

- The RCs were asked to provide information of such external competitive funding, where:
  - the funding decisions have been made during 1.1.2005–31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:
  1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation, EU, ERC, foundations, other national funding organisations, other international funding organizations), and
  2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness and future significance

RCMSER has been successful in obtaining funding from the EU, the European Research Council, and Terrific Science (a US organization), which is excellent. Domestic sources include the Academy of Finland, which is the largest single source of funds, TEKES (a fairly small contribution), Ministry of Education, and the Finnish Cultural Foundation. Compared to some other RCs, RCMSER seems rather well funded. Efforts to finance all graduate students are urgently needed, however.

2.8 The RC’s strategic action plan for 2011–2013

- RC’s description of their future perspectives in relation to research and doctoral training.

ASPECTS: Scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

The action plan calls for more joint research projects across departmental borders. They would be very welcome. They should also lead to publications in journals of adequate quality.

The need for making the PhD education more systematic or structured is recognized, which is fine. The question of funding all students or, alternatively, not admitting unfinanced students, should be given serious consideration.

The need for increasing cohesion within the RC is acknowledged, which is also fine.

2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1–8)

The RC’s fitness to the chosen participation category.

Category 4. The research of the participating community represents an innovative opening.

The definition of Category 4 quite accurately describes the state of RCMSER. The research and training activities of the centre can be said to have a very special national significance.
As far as research is concerned, ‘the proof of international success’ has not been obtained yet, but the RC should strive in that direction.

Numeric evaluation: 5 (Outstanding)

2.10 Short description of how the RC members contributed the compilation of the stage 2 material

The researchers and doctoral students of the RC have participated in a collaborative compiling of the evaluation documents.

2.11 How the UH’s focus areas are presented in the RC’s research

Focus area 4: The thinking and learning human being

The work of the RC is clearly related to the focus area: “The thinking and learning human being”.

2.12 RC-specific main recommendations

The RC is doing very important work in improving the quality of mathematics and science education in different levels of the school system. The unit has been successful in research based development on teaching practices and learning materials. However, the future success of the RC will also depend upon the scientific quality of the research of the RC. The RC has already started active international collaboration in research and development. It is not self evident that all these projects have been beneficial for the high level research. It seems that only some of the projects have resulted in publications in classified international scientific journals. Maybe it is wise to be more selective in international activities and pay more attention to the scientific quality of these projects and to the opportunity to produce high level international publication in the frames of these projects.

2.13 RC-specific conclusions

See 12.
3 Appendices

A. Original evaluation material
   a. Registration material – Stage 1
   b. Answers to evaluation questions – Stage 2
   c. List of publications
   d. List of other scientific activities

B. Bibliometric analyses
   a. Analysis provided by CWTS/University of Leiden
   b. Analysis provided by Helsinki University Library (66 RCs)
NAME OF THE RESEARCHER COMMUNITY:
Research Community for Mathematics and Science Education Research (RCMSER)

LEADER OF THE RESEARCHER COMMUNITY:
Professor Jari Lavonen, Department of Teacher Education, University of Helsinki

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:
- Material submitted by the RC at stages 1 and 2 of the evaluation
  - STAGE 1 material: RC’s registration form (incl. list of RC participants in an excel table)
  - STAGE 2 material: RC’s answers to evaluation questions
- TUHAT compilations of the RC members’ other scientific activities 1.1.2005-31.12.2010
- Analysis of publications data carried out by both CWTS and UH Library – results of UH Library analysis will be available by the end of June 2011

NB! Since Web of Science (WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library (results available by the end of June, 2011)
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

<table>
<thead>
<tr>
<th>1 RESPONSIBLE PERSON</th>
</tr>
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<tbody>
<tr>
<td>Name: Lavonen, Jari</td>
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<tr>
<td>E-mail: <a href="mailto:jari.lavonen@helsinki.fi">jari.lavonen@helsinki.fi</a></td>
</tr>
<tr>
<td>Phone: +358 9 191 29635</td>
</tr>
<tr>
<td>Affiliation: Department of Teacher Education, University of Helsinki</td>
</tr>
<tr>
<td>Street address: Siltavuorenpenger 5 (P.O. Box 9)</td>
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</tbody>
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<table>
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<tr>
<th>2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)</th>
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<tbody>
<tr>
<td>Name of the participating RC (max. 30 characters): Research Community for Mathematics and Science Education Research</td>
</tr>
<tr>
<td>Acronym for the participating RC (max. 10 characters): RCMSER</td>
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<tr>
<td>Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces): The researchers of the RC for Mathematics and Science Education Research (RCMSER) have collaborated since 2003 in several interdisciplinary research projects and researcher training. The epistemological background draws on mathematics, sciences and educational sciences as well as on pedagogy, psychology, sociology and philosophy. Research focuses on several themes related to teaching and learning of mathematics and science, nature and history of scientific knowledge, motivation, and professional development of teachers and teacher education. Furthermore, research focuses on broader educational themes, such as sustainable development.</td>
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</table>

The operational bases for the activities in the research community are various due to the various actors representing several university departments with different focus areas. Collaboration taking place across the organizational boundaries is a way to address these various needs of a specific research area investigated by a small number of researchers, for example through shared responsibility of supervision of PhD students. The RCMSER intends to (i) organise its research activities within the research projects with clear aims and external funding; (ii) promote international collaboration in the research projects and in PhD training; (iii) stimulate recruitment of Master and PhD students to the research projects; (iv) develop doctoral training also on the international level.

The Finnish Graduate School of Mathematics, Physics and Chemistry Education (FGSMPCSE) (director prof. Lavonen) has been an important forum for the joint doctoral training in RCMSER on both national and international level. Since the members of RC represent both subject departments and the teacher education department, the PhD students are to obtain their degree either in the faculty of science or in the faculty of behavioural sciences. Typically, a doctoral student is supervised by two supervisors, one specialised in the subject and the other in education. There have been altogether 30 students in the RC
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during the years 2005 – 2010, of which three have had a full-time position in the graduate school and 11 have completed their doctoral degree.

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC’s research: social sciences

RC’s scientific subfield 1: Education and Educational Research

RC’s scientific subfield 2: Physics, Multidisciplinary

RC’s scientific subfield 3: Chemistry, Multidisciplinary

RC’s scientific subfield 4: Mathematics, Interdisciplinary Applications

Other, if not in the list:

4 RC’S PARTICIPATION CATEGORY

Participation category: 4. Research of the participating community represents an innovative opening

Justification for the selected participation category (MAX. 2200 characters with spaces): The RCMSER is a forum for collaboration between research groups representing four departments (Department of Teacher Education and Departments of Physics, Chemistry and Mathematics and Statistics) with different expertise and facilities needed in the research field. The field has grown in the University of Helsinki in terms of researchers and PhD candidates in recent years, due to the national graduate school, increasing internationalisation and external research funding.

The research field has developed from various academic research traditions such as the history of mathematics and science, psychology as well as the disciplines of the natural and educational sciences themselves. This interdisciplinary research field has developed internationally as well as locally towards an academic field with its own research journals, research training and scientific conferences.

The RCMSER has become clearly visible in international arenas, in terms of research projects, conference contributions, and journal publications during the years 2005 – 2010. The members of the RC have

(i) had 5 research projects funded by the Academy of Finland, one project funded by TEKES, 2 projects founded by the EU framework programmes and 7 other EU funded research projects,

(ii) published 49 papers in international refereed journals

(iii) participated in 3 international research organizations, in 7 editorial boards and acted as a reviewer in several journals

(iv) organized 22 international meetings or conferences

(v) given 44 invited talks and more than 30 paper presentations in international conferences

(vi) supervised 15 PhD thesis as a main or second supervisor

(vii) acted 15 times as an opponent and 17 times as an pre-evaluator of a PhD dissertation

(viii) evaluated candidates for a professorship (3 positions) and a docent (10 times)

(ix) acted as a member in science foundations and participated in 4 international research and researcher training evaluation committees.
The RC for MSER concentrates on interdisciplinary research on mathematics and science education. The epistemological background draws on mathematics, natural sciences and educational sciences as well as on pedagogy, psychology, sociology, and philosophy. Research focuses on several educational themes related to the background disciplines like teaching and learning mathematics and science, nature and history of scientific knowledge, motivation and learning, professional development of teachers as well as teacher education. Furthermore, research focuses also on broader educational themes, such as sustainable development. Collaboration taking place across the organizational boundaries is a way to address these various needs of a specific research area investigated by a small number of researchers also on a national level.

The activities of the RCMSER are organised through the research projects. There have been in average 18 research projects per year during the years 2005 – 2010 directed by the senior researchers of the RCMSER. Most of the projects are funded by external funding. In average in 4 projects there are members from several departments.

The researcher training is organized through research projects and in joint activities. Most of the joint activities are organized through activities of the Finnish Graduate School of Mathematics, Physics and Chemistry Education. International collaboration provides a fruitful forum for activities as part of the researcher training. Annual joint meetings of Graduate schools of Science Education Research from five different countries (Finland, Germany, Sweden, Estonia, and the Netherlands) have been organised altogether 6 times during the years 2005 – 2010. Moreover there have been 3 joint meetings of Nordic science education graduate schools under the NordForsk programme. The members of the RCMSER community have been active in writing the project application and in organizing the researcher training. In average 7 supervisors and 10 PhD students have participated in each international PhD training course. Furthermore, the PhD students have participated in the ESERA summer school.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): Students’ interest in mathematics and science has decreased during the last 40 years. The social position of scientists has weakened in developed countries, like Finland. It seems that students are unaware of the range of career opportunities opened up by studying science and mathematics. Therefore, it is important to improve science and mathematics education based on research knowledge and to find innovative solutions for teacher education in order to face future challenges.

The RC for Mathematics and Science Education Research (RCMSER) has had a special national interest concerning the status of mathematics, science and technology and careers in those fields and especially the status of mathematics, physics and chemistry teachers. Research has been an important foundation for
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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

further development of research-based teacher education, and consequently, the potential starting-point for educating teachers with the ability to engage in professional development as a teacher. The national LUMA centre (director prof. Aksela) provides activities for school teachers in mathematics, chemistry and physics which have been a way to disseminate research outcomes of the RCMSER.

RCMSER is an interdisciplinary community with expertise that augments each other’s educational field. This has had an effect to both teaching and research at the subject departments and at the department of teacher education. For example, collaboration has strengthened the development and research of teaching and learning at the departments.

The general aim of the RCMSER is to create a research-based foundation for the continuous development of mathematics, physics and chemistry education, both at school and university level. Since this can only be achieved by bringing together perspectives provided research on pedagogy and subject matter knowledge, participating departments represent mathematics, physics and chemistry as well as teacher education. This community, too, finds itself just at the beginning of a new phase.

The employment situation of PhDs is good because of the retirement and lack of competent staff in teacher education in Helsinki but especially at other universities in Finland.

Keywords: mathematics education, physics education, chemistry education, teacher education, teaching and learning, nature of knowledge

6 QUALITY OF RC’S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC’s research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): The aim of the PhD studies in the RCMSER is to provide students with an in-depth knowledge of the mathematics and science education research and the capability to produce novel scientific knowledge independently. The RCMSER brings together the researches of math. and science education to form a pool of supervisors for training experts in the field of the RC. There are four ways to uphold the quality of the supervision, research and collaboration within the community:

(i) Since the students’ and research projects are interdisciplinary and focusing on problems where both deep subject and pedagogical knowledge are needed, the researchers in the research projects and students’ supervisors comes across the organisational boundaries. There are also seminars and national meetings where students and supervisors from different departments interact with each other.

(ii) The educational environment comprises of sub-research groups in each department with international profiles and researcher contacts. The supervisors publish together with PhD students in international journals.
(iii) The senior researchers and PhD students participate in the national and international graduate school activities at least three times a year. The topics of courses are, for example, writing scientific text and philosophical basis of educational research. Students’ evaluations of the activities have been collected, analysed and discussed in order to develop the courses.

(iv) International collaboration has been fruitful for students and researchers in RC. Students and senior researchers have actively participated in international conferences like EARLI, CERME, PME, ICME, NARST, AERA, GIREP and ESERA. Long term collaboration with the graduate school at the University of Duisburg Essen, Germany, Swedish National Graduate School in Science and Technology Education Research (FontD) and other institutes, like Tartu and Oslo universities have been organised. There have been PhD courses organised in Nordic co-operation with NordForsk funding. Four professors have visited the researching departments (at least four months stay each) during the last 5 years.

Comments on how the RC’s scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): The research activities of the RCMSER are organized through research projects in which senior researchers and PhD students are doing research. The preliminary results of each project are normally published as conference papers. After improvements based on the feedback from the conference, the results are published in scientific journals.

The external evaluations should be based on the self-evaluation of the MSER community and the evidence in the TUHAT-database. Activities of each participating institutes and whole RC collaboration should be evaluated. Following areas of the RCMSER could be evaluated in research evaluation:

GOAL SETTING OF THE RCMSER. The RCMSER intends to (i) organise its research activities within the research projects with clear aims and external funding; (ii) promote international collaboration in the research projects; (iii) stimulate recruitment of Master and PhD students to the research projects; (iv) develop doctoral training on the international level.

ENCOURAGING MASTER AND PHD STUDENTS TO JOIN THE RCMSER ACTIVITIES. The research projects are described and the students are encouraged to join the projects during their Master or PhD studies.

SUPERVISION. The supervision is challenging because the PhD projects are interdisciplinary and focusing on problems where both deep subject and pedagogical knowledge are required.

COURSES. In addition to department level courses and seminars, courses and seminars of Finnish Graduate School of Math, Phys. and Chem. Education are used. Moreover, there have been at least 3 international PhD courses or seminars, including funding, available every year for PhD students.
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RC-SPECIFIC STAGE 1 MATERIAL (registration form)

THE PHD-DISSERTATION. The RCMSER has done systematic work to encourage PhD students to write articles and publish them in the international refereed journals.

COLLABORATION. For organizing collaboration between partner institutions and a high quality researcher training some structures like common seminars are needed. Furthermore, other scientific activities are needed.

QUALITY ASSURANCE AND EVALUATION. Students’ course evaluations are collected and discussed by supervisors. Moreover, planning and evaluation mee
**LIST OF RC MEMBERS**

**NAME OF THE RESEARCHER COMMUNITY:** RCMSER

**RC-LEADER:** J. Lavonen

**CATEGORY:** 4

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<th>Last name</th>
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<th>Affiliation</th>
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<tr>
<td>1 Lavonen</td>
<td>Jari</td>
<td>X</td>
<td>Professor</td>
<td>Department of Teacher Education</td>
</tr>
<tr>
<td>2 Hannula</td>
<td>Markku</td>
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<td>4 Jasti</td>
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INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

Name of the RC’s responsible person: Lavonen, Jari
E-mail of the RC’s responsible person: jari.lavonen@helsinki.fi
Name and acronym of the participating RC: Research Community for Mathematics and Science Education Research, RCMSER
The RC’s research represents the following key focus area of UH: 4. Ajatteleva ja oppiva ihminen – The thinking and learning human being

Comments for selecting/not selecting the key focus area:

Description of the RC’s research focus, the quality of the RC’s research (incl. key research questions and results) and the scientific significance of the RC’s research for the research field(s).

Research focus
Mathematics and science education research has developed from various academic research traditions first and foremost based on natural and educational sciences themselves but also from the history and philosophy of mathematics and science, psychology and cognitive sciences. This interdisciplinary research field has developed internationally as well as locally during the last 30 years towards an academic field with its own research journals, research training and scientific conferences.

The focus of the research produced by the research community for Mathematics and Science Education Research (RCMSER) is on several themes related to teaching and learning of mathematics and science, such as the nature and history of scientific knowledge, the use of technology in education, motivation and affects, professional development of teachers and teacher education. The epistemological background draws on mathematics, science and educational sciences as well as on pedagogy, psychology, sociology and philosophy. The RC:

(i) organizes its research activities within the research projects with clear aims and external funding;
(ii) promotes international collaboration in the research projects;
(iii) stimulates recruitment of doctoral candidates to the research projects;
(iv) develops doctoral training on the international level.

Furthermore, members of the RC are working in mathematics and science teacher education and, therefore, the research focuses also on the themes concerning teaching and learning mathematics and science or teacher education. The research community aims to maintain and further develop the basis for research-based teacher education. For this purpose, the research focuses on three themes: (1) research on teacher education in the framework of university pedagogy; (2) research on teaching and learning of contents in respective subjects; and (3) research on teaching and learning at the subject departments in order to develop the quality of university education. The RC has a national and societal responsibility to develop national scientific discourse concerning the respective disciplines and teachers’ pre- and in-service training in Finland.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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The quality of the RC's research

The activities of the RCMSER are organised through research projects where researchers work together in various, different size research groups. The quality of the research activities is described through six examples of research projects carried out in research groups:

Research on physics teacher education concentrates mainly on the in-depth analysis of physics conceptual structure and the processes of knowledge production for the purposes of teacher education. The practical application of this research is the design of better instructional strategies for teacher education. The research project concentrates on novel ways of exploring the instructional methods and approaches based on concept maps and concept mapping supporting the formation of organized knowledge. One objective of the research is to better understand what processes of the learners’ conceptual development and growth can be made visible in concept networks. The second objective is to develop a method of analysis, which reliably captures the essential features of physics concept networks. Published results and reports and the feedback from the practical implementation in teacher education document the benefits of the developed methods and their role in forming the core component of teachers’ pedagogical content knowledge.

MaterialsScience –project is an example of design-based research project based on university-school partnership, where the design and implementation of research-based ICT-enhanced modules on Material Properties has been developed. The main focus has been on students’ learning regarding conceptual change and motivational aspects in the learning process. The results of the project help science teachers to make science education more interesting and motivating, and therefore, the results are used in teacher education.

Since models and visualization are essential in teaching and learning chemistry, Finnish school teachers’ experiences and views on applying computer-based molecular modeling in chemistry instruction has been in the focus of research. The key question is focused on teachers’ starting-points and possibilities to enhance motivation by using the available technological applications. The research seems to open up new possibilities for the use of visualizing chemical concepts and phenomena in chemistry education at different levels.

Research on the use and development of educational technology in mathematics and science education has been one of the main themes of RC. A special focus has been on the development and adoption of technological innovations. For example, research has focused on teachers’ views on the use of ICT as part of assessment practices in mathematics and science teaching.

Several research projects on mathematics related affect have generated a well developed theoretical framework and reliable survey instruments. Empirical studies using mixed methods have provided descriptions of students’ and teachers’ belief systems and also detailed descriptions of the development and dynamics of affective constructs.

The multidisciplinary project on Sustainable Food Education for Self-Efficacy Development focuses on promoting a sustainable society by enhancing awareness and self-efficacy in environmental and socio-cultural questions associated with food production, consumption and health on the local and international levels.
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RC-SPECIFIC STAGE 2 MATERIAL

Scientific significance

The RCMSER has become internationally visible in international arenas, in terms of research projects, conference contributions, and journal publications during the years 2005 – 2010. The members of the RC have

(i) had 5 research projects funded by the Academy of Finland, one project funded by TEKES, 2 projects founded by the EU framework programmes and 7 other EU funded research projects,
(ii) published 49 papers in international refereed journals
(iii) participated in the boards of 3 international research organizations, in 7 editorial boards and acted as a reviewer in several journals
(iv) organized 22 international meetings or conferences
(v) given 44 invited talks and more than 30 paper presentations in international conferences
(vi) supervised 15 PhD thesis as a main or second supervisor
(vii) acted 15 times as an opponent and 17 times as an pre-evaluator of a PhD dissertation
(viii) evaluated candidates for a professorship (4 positions) and a docent (10 times)
(ix) acted as a member in science foundations of various countries and in international expert or steering groups, like PISA 2015 Science Expert Group and The Thematic Working Group on Mathematics, Science and Technology and, moreover, participated in 4 international research and researcher training evaluation committees.
(x) been internationally active: visited 43 foreign universities, hosted visitors from more than 100 foreign universities and collaborated with 4 research fellows visiting the community for more than 4 months.
(xi) been active partners with the corporations and associations in the field of teaching and learning mathematics and science nationally, for example, with ML-seura, LUMA, MAOL

Ways to strengthen the focus and improve the quality of the RC’s research.

This evaluation process is an important step in identifying RC strengths and weaknesses and finding ways to improve practice. The diversity of research topics is considered as a strength in addressing different aspects of the field. However, realizing the full potential of the richness of topics would require well-organized collaboration. The present situation does not allow full benefit from collaboration between members of the RC. It would be useful to find clusters of research that could function as foci, around which the RC activities could be built in the future. More consideration should be given to the quality of research and to its impact on a general level, not only on the national level. In this, consideration should be given to high impact venues of publication and dissemination of results. In addition to publishing in subject specific conferences and journals, papers should be submitted also to high quality general education journals. We will continue to participate in doctoral schools and research networks that cross national borders and the boundaries of disciplines.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

2 PRACTICES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC's principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practices and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

The aim of PhD studies in the RCMSER is to provide doctoral candidates with an in-depth knowledge of mathematics and science education research and the capability to produce novel scientific knowledge independently. The RC brings together the researches of mathematics and science education to form a pool of supervisors for training experts in the field of the RC. There are five ways to uphold the quality of the supervision, research and collaboration within the community:

(i) Recruitment and selection of doctoral candidates

In the selection of doctoral candidates for doctoral training, general rules of the University of Helsinki have been followed. Selection is based on the research, publication and study plan. The doctoral candidates are selected by the faculty of science or faculty of behavioural sciences. After the selection, the candidates typically also become members of the Finnish Graduate School of Mathematics, Physics and Chemistry Education (FGSMPCE).

(ii) Supervision of doctoral candidates

Each doctoral candidate has a 'main supervisor' (professor, responsible for the candidate's studies) and two other supervisors. The educational environment comprises of sub-research groups in each department with international profiles and researcher contacts. The supervisors publish together with doctoral candidates in international journals and books. Since the candidates' and research projects are interdisciplinary and focusing on themes where both deep subject and pedagogical knowledge are needed, the researchers in the research projects and candidates' supervisors come in some cases across the organisational boundaries. There are seminars and national meetings where doctoral candidates and supervisors from different departments interact with each other.

(iii) Good practices, research group collaboration, courses and quality assurance in doctoral training

The senior researchers and doctoral candidates participate in the national and international graduate school activities two or three times a year. The topics of courses are, for example, scientific writing and philosophical basis of educational research. Candidates' evaluations of the activities have been collected, analysed and discussed in order to develop the courses.

In the research groups of the RC, doctoral training is conceived as an integral part of the research carried out in the group. Consequently, the doctoral training, supervision and guidance take place within the day-to-day work on research. This mode of doctoral instruction is felt suitable for small research groups sharing interests and close collaboration. The doctoral candidates are integrated into the research collaboration, research networks and research communities already from the beginning of their academic careers. The doctoral candidates are also coached to communicate about their research in international conferences and publications. The practice varies between the research groups: the aim is that a doctoral candidate participates and gives a presentation in one to three national and international conferences a year, submits papers in international refereed journals (usually with a success rate of one out of two submissions accepted) and additionally publishes two papers in refereed conference proceedings. This helps to maintain good quality standards of scientific communication, enables professional peer-to-peer feedback of research results and methods, and in a very natural way...
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helps doctoral candidates to get acquainted with professional means of communication already during their doctoral studies. This mode of combining research and doctoral training follows more or less the same pattern as the doctoral training in subject departments in general, but is probably somewhat atypical in the field of educational sciences.

The FGMPCE has developed a solid mechanism for collecting, analyzing and discussing feedback of the doctoral courses and supervision. The aim is to develop a holistic quality assurance system for researcher training. There have been few conflicts between the doctoral candidates and supervisors. In the case of conflicts, the director of the FGMPCE has discussed the issues with the candidate and his/her supervisor. The student feedback is analysed and used for improving the doctoral training in order to better address the needs of individual students with various backgrounds.

(iv) Collaboration with graduate schools/doctoral programmes and training courses

An important part of the doctoral training in RC is organized through research projects and in joint activities, like courses in research methodology and scientific writing. Most of the joint activities are organized through activities of the Finnish Graduate School of Mathematics, Physics and Chemistry Education (FGMPCE). The director of this graduate school has been a member of the RC during 2005-2010. The FGMPCE has been an important forum for the joint doctoral training in RCMSER on both national and international level. It has succeeded well in applying for funds for organising this training.

International collaboration has been fruitful for doctoral candidates and researchers in RC. Doctoral candidates and senior researchers have actively participated in international conferences like EARLI, CERME, ICME, NARST, AERA, GIREP and ESERA. Long term collaboration with the graduate school at the University of Duisburg Essen, Germany, Swedish National Graduate School in Science and Technology Education Research (FontID) and other institutes, like Tallinn, Tartu and Oslo universities have been organised. PhD courses have been organised in Nordic co-operation. Four professors have visited the research community at least for four months stay each during the last 5 years. There are four types of international doctoral training activities:

(a) Common Nordic doctoral training courses funded by “NordForsk” or Nordic Council of Ministers (Nordisk Ministerrådet). Moreover, there have been three joint meetings of Nordic science education graduate schools and five summer schools of the Nordic Graduate School of Mathematics Education under the NordForsk programme.

(b) Doctoral training courses funded by European Science Education Research Association (ESERA) and European Society for Research in Mathematics Education (ERME)

(c) International research collaboration of research groups of RC and participation to the conferences.

(d) Annual international joint meetings of Graduate schools of Science Education Research have been organised together with five countries (Finland, Germany, Sweden, Estonia, and the Netherlands). The meetings have taken place altogether six times during the years 2005 – 2010. In average, 7 supervisors and 10 doctoral candidates have participated in each international PhD training course.

(v) Assuring good career perspectives for the doctoral candidates/new doctorates

The doctoral training aims at supporting doctoral candidates in acquiring wide-range research knowledge and skills in addition to concentrating on the specific research area: doctoral candidates are to become experts, autonomous researchers in the future. There have been altogether 30 doctoral candidates in the RC during the years 2005 - 2010, of which three have had a full-time position in the graduate school. Altogether 12 doctoral candidates have completed their studies during the years 2005
RC-SPECIFIC STAGE 2 MATERIAL

- 2010. The national and international joint activities of the FGSPCEN aim at assuring good career perspectives for the doctoral candidates.

- RC’s strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

Organising PhD training and ensuring its quality is a challenge due to various expertise needed in supervision. There is a challenge to limit the number of PhD project topics. The fruitful solution to guarantee the high quality of research is to follow the established standards of international research communities in the field, for example, through peer-review procedures as widely as possible.

The challenges in maintaining and developing the quality of doctoral training are:
1) the amount of doctoral candidates working on their degree part-time alongside their everyday work.
2) finding a common basis and themes for the courses
3) integrating the research interests of the research groups and individual doctoral candidates in order to create a basis for fruitful cooperation and supervision
4) the consolidation of various traditions of doctoral training at university departments
5) to keep on developing the recruitment of doctoral candidates in order to guarantee the quality of doctoral candidates.

SOCIAL IMPACT OF RESEARCH AND DOCTORAL TRAINING (MAX. 4000 CHARACTERS WITH SPACES)

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

The RC for Mathematics and Science Education Research (RCMSER) has a special national interest concerning the status of mathematics, science and technology and careers in those fields, especially the status of teachers in respective subjects. Research has been an important foundation for further development of research-based teacher education, and consequently, the potential starting-point for educating teachers with the ability to engage in professional development. Finland is one of the few countries in Europe where there is no serious shortage of mathematics and science teachers. Therefore, it has been important to improve science and mathematics education at school and at universities based on research knowledge and to find innovative solutions in order to face the previous challenges as well as the future ones.

The main societal impact of research-based teacher education comes from competent school teachers, who have received high quality teacher education in well-designed and tested teacher education programmes and where scientifically competent teacher educators are educating student teachers. In addition, to this basic and most important task societal impact comes of the national LUMA Centre (LU = ‘luonnontieteet’ (natural science) and MA = mathematics) directed and coordinated by one of the members of the RC. LUMA provides activities for school teachers in mathematics, chemistry and physics, which is a way to disseminate research outcomes of the RCMSER. The LUMA centre is a forum for collaboration between school and research fields organised through several resource centers, such as LumO (Dept. of Teacher Education), Summamutikka (Dept. of Mathematics and Statistics), Kemma (Dept. of Chemistry), and F2K (Dept. of Physics).

The research community interacts with and contributes to the society in various ways through activities of the LUMA centre, like research and developmental projects in cooperation with schools as well as through pre-service and in-service mathematics and science teacher education. There have been several
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in-service teacher training courses under the themes of modelling and visualization, science inquiry, out-of-school learning and chemistry today. In addition, some of the research projects have been conducted in close collaboration with companies and industrial organizations. The latest research information is communicated to larger audiences through the websites of the LUMA centre and two web journals.

Staff of the RC is also writing research reports and popularised articles in Finnish in order to develop Finnish discipline specific scientific language. There are several forums for the Finnish articles, like teacher journals (Dimensio), journals of professional associations (Arkimedes, Kemia Kemi) and proceedings of national researcher meetings (Ainedidaktiikan päivät, Matsu-tutkimuksen päivät). Moreover, almost 100 textbooks during the years 2005 – 2010 for school science and mathematics have been written by the RC staff members. Staff of the RC have good relations with several interest groups, like the Ministry of Education and Culture and the National Board of Education.

- Ways to strengthen the societal impact of the RC’s research and doctoral training.

In general, the societal impact of the research is actively taken care through several forums. The link between research and practice is easy to make through applying research knowledge in teacher education. The communication of research information and societal interaction can be strengthened in the future, for example, through

- including popularization of research in doctoral training
- giving opportunities to have experiences in cooperation with the public/third sector in doctoral training and conducting research projects in collaboration with societal partners, such as schools, industry and the private sector. In addition to gaining research knowledge, the essential aspects of such research projects is to develop and test artefacts in practice
- the themes and focus of the research should be relevant, authentic and current from the point of view of school reality, at least applicable in the educational context at different levels
- special focus should be on in-service teacher education which is a way to influence the current school system

Description of the RC’s research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

There have been approximately 18 research projects per year during the years 2005 – 2010 directed by the senior researchers of the research community for Mathematics and Science Education Research (RCMSER). The RCMSER organises research collaboration, research mobility and joint doctoral training through activities organised by research groups. However, many activities are coordinated by the Finnish Graduate School of Mathematics, Physics and Chemistry Education (FGSMPCE). In some cases, the supervisors of doctoral candidates come from two departments because of the interdisciplinary nature of the project.

In general, the RCMSER has been internationally active. Members of the RC have visited 43 foreign universities and hosted visitors from more than 100 foreign universities. Moreover, there have been 4 research fellows visiting the community for more than 4 months. It is common that the visitors give lectures to the whole RC and visit more than one research group. Members of the RC have organized 22 international meetings or conferences and have given 44 invited talks and more than 30 paper presentations in international conferences during the years 2005 – 2010.
The international and national research collaboration and researcher mobility are various due to the various actors representing several university departments with different focus areas. Collaboration taking place across the organizational boundaries is a way to address these various needs of a specific research area investigated by a small number of researchers, for example through shared responsibility of supervision of doctoral candidates. The RCMSER intends to (i) organise its research activities within the research projects with clear aims and external funding; (ii) promote international collaboration in the research projects and in PhD training; (iii) stimulate recruitment of Master students and doctoral candidates to the research projects; and (iv) develop doctoral training also on the international level.

International cooperation has primarily taken place through research and developmental projects. The research group for science education at the Department of Teacher Education has participated actively in several EU funded research projects during the years 2005 – 2010:

- Gender Issues, Science Education and Learning (3 countries/universities)
- The GRID project (2004-2006) (5 countries/universities)
- Materials Science (6 countries/universities)
- The effective use of computer aided teaching and learning materials in science teaching - a teacher training course with a European perspective CAT (6 countries/universities)
- SCIENCE-TEACHER EDUCATION ADVANCED METHODS The S-TEAM Project (12 countries/universities)
- SEED-project 2009-2011 (two universities, one research institute i

• RC’s strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

The research community has active collaboration both nationally and internationally. Especially, the collaboration with other graduate schools has been important for both researchers and doctoral candidates. Moreover, the number of EU funded projects where researchers come from various EU Universities has been important for research collaboration and publishing together in international cooperation. Finally, there are well established research networks with several Scandinavian, US and Asian universities. Enough resources are allocated for research mobility.

However, some challenges remain:

• improving the way the research community could benefit from international mobility as an organisation instead of individual collaboration and establish a structure for the long-run collaboration as an organisation
• developing the organisational and bureaucratic structures that provide systematic conditions for organising researcher mobility in more convenient ways than exists at the moment
• finding the collaborative partners interested in the research topics relevant for the research com
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

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5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC’s research environment (e.g. research infrastructure, balance between research and teaching duties).

The researchers of the RC for Mathematics and Science Education Research (RCMSER) have collaborated since 2003 in several interdisciplinary research projects and researcher training. The RCMSER is a forum for collaboration between research groups representing four departments (Department of Teacher Education and Departments of Physics, Chemistry and Mathematics and Statistics) with different expertise and facilities needed in the research field. The field has grown in the University of Helsinki in terms of researchers and doctoral candidates in recent years, due to the national graduate school, increasing internationalisation and external research funding. There is one or two principal investigator(s) who is (are) responsible for research projects and doctoral training at each department.

The number of staff members at each department is:

Department of Teacher Education
- 2 Professors
- 5 University Lecturers
- 7 Doctoral candidates

Department of Physics
- 1 Professor
- 1 University Lecturer
- 5 Doctoral candidates

Department of Chemistry
- 1 Professor
- 1 University Researcher
- 2 Doctoral candidates

Department of Mathematics and Statistics
- 2 University Lecturers
- 1 Doctoral candidate

The operational bases for the activities in the research community are various due to the various actors representing several university departments with differing profiles of tasks. Collaboration taking place across the organizational boundaries is a way to address these various needs of a specific research area investigated by a small number of researchers, for example, through shared responsibility of supervision of doctoral candidates. The RCMSER intends to:

(i) organise its research activities within the research projects with clear aims and external funding;
(ii) promote international collaboration in the research projects and in PhD training;
(iii) stimulate recruitment of Master and PhD students to the research projects;
(iv) develop doctoral training also on the international level.

In average, there have been 18 research projects per year during the years 2005 – 2010 directed by the senior researchers of the RCMSER. Most of the projects are funded by external funding. In 4 of those projects, members represent more than one department.

The full research potential of RC cannot be realized at the moment. The listing above includes only a part of our doctoral candidates, because most of them have no funding and hence their progress is slower. Professors as well as university lecturers in our RC are burdened with administrative tasks more than a ‘fare share’ would be. The researchers having a position of a university lecturer have heavy teaching loads, sometimes more than 360 contact hours per year (the absolute maximum is 392 hours per year as a full-time university teacher with no research tasks). External research funding would be a way to allocate more time for research by allowing university lecturers and doctoral students to concentrate on research tasks. As external funding is highly competitive, the RC should collaborate in designing top quality applications.

Altogether, there are few resources for research activities besides university level teaching and administrative work. Furthermore, only one post doc

- **RC’s strengths and challenges related to operational conditions, and the actions planned for their development.**

  The strength of operational conditions is a multiprofessional community with various experts and contacts outside the RC. In addition, the RC has close contact with schools, educational instances and several interest groups. The challenges to be addressed are partly related to the diverse research produced in the RC:

  - most important challenge is recruitment of new students and post graduates by making the research field attractive
  - insufficient recourse allocation may weaken RC’s possibilities for professional growth and lead to deterioration of teaching and research
  - looking for a balance between different tasks of university researchers research, teaching and administration duties as well as being an active and international cosmopolitan
  - apply for external funding allowing intensive, long-term research activities beside other duties
  - increase the amount of post doc positions in the research community
  - timing of other work tasks should allow focusing on research activities
  - support collaboration with other researchers within the RC and other research communities

**6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4000 CHARACTERS WITH SPACES)**

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC’s research focus and strengthening of the RC’s know-how.

The RC for Mathematics and Science Education Research (RCMSER) is a forum for collaboration between research groups representing four departments (Department of Teacher Education and Departments of Physics, Chemistry and Mathematics and Statistics) with different expertise and facilities needed in the
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The field has grown in the University of Helsinki in terms of researchers and PhD candidates in recent years, due to the national graduate school, increasing internationalisation and external research funding. The responsibilities are distributed in accordance with projects: in each project, there is one or two principal investigator(s) who is (are) responsible for research projects and doctoral training at each department. The leadership of the research community is distributed among the research groups that coordinate individual projects at their respective departments.

The members of the research community work at different departments which have differing cultures regarding administration and traditions of research. There is no need to harmonise the procedures but to be explicit about the focus of research and collaborate concerning the contents. Therefore, the research community has no explicit leader but rather a collegial cooperation between the responsible investigators. The culture of leadership is liberal and mostly based on collaboration between the members of the community as experts: the coordination concerns research themes and organising the research activities but every research group has its freedom to implement and organise their activities in the best possible way, for example, in accordance with the working culture of the respective department. All active members of the community can contribute and influence the activities taking place in the community, for example, active doctoral candidates take part in designing the doctoral training and have a chance to give feedback.

However, there are two common ways to organise the activities related to the RC. Firstly, the doctoral training activities in RC are organised through the Finnish Graduate School of Mathematics, Physics and Chemistry Education (FGSMPCE) which is in close collaboration with the community. The director of this graduate school is a member of the RC, and therefore, it is easy to coordinate the doctoral activities to address the needs of junior researchers. The FGSMPCE has been an important forum for the joint doctoral training in RCMSER on both the national and international level. Since it has succeeded well in applying for funds for organising this doctoral training, it has made its contribution also to operational conditions. Secondly, part of the activities considering interaction and contribution to the society (collaboration with public, private and/or 3rd sector) are coordinated by LUMA centre. The director of the LUMA centre is also a member of the RC.

RC’s strengths and challenges related to leadership and management, and the actions planned for developing the processes.

The strength of the RC is in its democratic culture, which allows different actors with different expertise and focus area to have an influence on the community. It also allows individual research groups to manage their activities in accordance to their specific needs, for example, regarding cooperation with external instances.

On the other hand, the de-centralized system for managing the activities can be seen as a weakness of the RC. The challenges are

- more solid leadership to support a common image as a RC: it is necessary to design the research activities to form more coherent areas of research
- to be aware on the activities in separate research groups: only awareness and coordination between the members of the RC establish a basis for common grounds for the activities. However, this does not mean strictly centralized management
- the research community should have systematically frequent meetings where all members of the community could contribute and learn from others
- to organise the activities in a way that students/doctoral candidates would feel more empowered.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

7 EXTERNAL COMPETITIVE FUNDING OF THE RC

- Listing of the RCs external competitive funding, where:
  - the funding decisions have been made during 1.1.2005-31.12.2010, and
  - the administrator of the funding is/has been the University of Helsinki

- Academy of Finland (AF) - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010: 1160000

- Finnish Funding Agency for Technology and Innovation (TEKES) - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010: 180000

- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010: 1010000

- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010: 250000

- International and national foundations - names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the foundations: New Millennium Learners, a project ICT and initial teacher training
  - Finnish Ministry of Education
  - Kulttuurirahasto
  - National Board of Education
  - Terrific Science, USA
  - The Finnish Cultural Foundation
  - total amount of funding (in euros) from the above-mentioned foundations: 2600000

- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the funding organizations:
  - total amount of funding (in euros) from the above-mentioned funding organizations:

- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
  - names of the funding organizations:
  - total amount of funding (in euros) from the above-mentioned funding organizations:
Description of the RC’s future perspectives in respect to research and doctoral training.

There is an international call for mathematics and science education research. This is because several stakeholders, like the European Commission (High Level Group on Human Resources for Science and Technology) and OECD, have recognised and reported decrease in students’ interest in school Mathematics and Science and towards careers in Science, Technology, Engineering and Mathematics (STEM). The social position of scientists has weakened in developed countries, like Finland. It seems that students are unaware of the range of career opportunities opened up by studying science and mathematics. Therefore, it is important to improve Science and Mathematics education based on research knowledge and to find new innovative solutions for Mathematics and Science education at school and in teacher education in order to face future challenges. The RC for Mathematics and Science Education Research (RCMSER) has been and will be active in the future in engaging in science and mathematics education research and in making this research-based knowledge visible for teachers and student teachers in in- and pre-service teacher education as well as in communicating this knowledge in public. The influence of the RC to the development of national discourse and education at school and in teacher education is also important.

RCMSER is an interdisciplinary and international community with expertise in science and mathematics as well as in educational research. Because of this interdisciplinary, the research might be too diverse in research topics, not allowing full benefit from collaboration between members of the RC. Therefore, it would be useful to find clusters of research that could function as foci, around which the RC activities could be built in the future. Even if the international collaboration is already strong, long-term strategic planning is needed. For example, recruitment of international supervisors and PhD students should be discussed. There are now two international PhD students and there have been 4 international supervisors visiting the RC at least for four months.

In the future, the research activities of the RCMSER will still be organized through research projects, in which senior researchers and PhD students do research together. The aim is to publish the preliminary results of each project first as conference papers and then, after improvements based on the feedback from the conference, the results should be published in scientific journals. However, the venues of publication should be selected more carefully: papers should be submitted also to high quality journals and also in the fields of general education.

The strength of the RC is democratic culture, which allows different actors with different expertise and the focus area to have an influencing role in the community. However, the RC should improve the way the research community as an organisation could also benefit from the success of separate research groups. More solid leadership is needed to support a common image as a RC. It is necessary to design the research activities to form more coherent areas of research and find the collaborative partners interested in the research topics relevant for the RC. It is appropriate to be aware of the activities in separate research groups, and, therefore, the research community should have systematically frequent meetings where all members of the community could contribute and learn from others.

There are challenges for organising more systematic evaluation of doctoral training regarding the courses and supervision of the doctoral candidates. Until now, the feedback about doctoral candidates’ experiences and opinions about the supervision and doctoral courses have been gathered only three times. Moreover, the feedback should be used more systematically by supervisors and responsible
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

researchers designing the activities. In addition, there should be a more easy and systematic way for solving the conflicts and disagreement between the supervisors and PhD students.

The stage 2 materials have been compiled collaboratively by the staff members and students of the RC. The versions of the documents have been distributed via e-mail list after each updating, altogether three times. Doctoral candidates have contributed especially to the parts describing the doctoral training. One workshop was organised with the representatives of each research group, and the strengths and challenges of the RC were discussed. The following areas were discussed while preparing the material for evaluation:

- the aims set for the RC
- the topics and methodological issues and common topics
- organising collaboration between partner institutions
- encouraging doctoral candidates to join the research activities
- the challenges of supervision due to differing interdisciplinary projects
- the courses and seminars as part of activities provided by the community
- encouraging students to publish articles in international refereed journals
- the implementation and the quality of doctoral training
- the feedback on doctoral training and ways to use it for improving activ

SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

The stage 2 materials have been compiled collaboratively by the staff members and students of the RC. The versions of the documents have been distributed via e-mail list after each updating, altogether three times. Doctoral candidates have contributed especially to the parts describing the doctoral training. One workshop was organised with the representatives of each research group, and the strengths and challenges of the RC were discussed. The following areas were discussed while preparing the material for evaluation:

- the aims set for the RC
- the topics and methodological issues and common topics
- organising collaboration between partner institutions
- encouraging doctoral candidates to join the research activities
- the challenges of supervision due to differing interdisciplinary projects
- the courses and seminars as part of activities provided by the community
- encouraging students to publish articles in international refereed journals
- the implementation and the quality of doctoral training
- the feedback on doctoral training and ways to use it for improving activ
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RCMSE/Lavonen

1 Analysis of publications

- Associated person is one of Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi, Markku Sakari Hannula, Markku.Hannula@helsinki.fi, Erkki Pehkonen, Erkki.Pehkonen@helsinki.fi, Karl Jusufi, Karl.Jusufi@helsinki.fi, Asko Laine, Asko.Laine@helsinki.fi, Antti Laherto, Antti.Laherto@helsinki.fi, Terhi Katariina Mäntylä, terhi.mantyla@helsinki.fi, Sharareh Majidi, sharareh.majidi@helsinki.fi, Maija Aksela, maija.aksela@helsinki.fi, Jukka Mika Keskustalo, jukka.m.keskustalo@helsinki.fi, Heimo Saarikko, Heimo.Saarikko@helsinki.fi, Leena Heinäniemi, leena.heinaniemi@helsinki.fi, Liisa Mitya Näveri, liisa.naveri@helsinki.fi

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<th>2008</th>
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<td>51</td>
<td>57</td>
<td>68</td>
<td>47</td>
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<td>3</td>
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<td>2</td>
<td>1</td>
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<td>3</td>
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<td>C1 Published scientific monograph</td>
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<td>D4 Published development or research report</td>
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<td>D5 Text book or professional handbook or guidebook or dictionary</td>
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<td>E1 Popular article, newspaper article</td>
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<td>3</td>
<td>5</td>
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<td>E2 Popular monograph</td>
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</tr>
</tbody>
</table>

1
2 Listing of publications

A1 Refereed journal article

2005


Abulencia, A, Orava, R, Saarikko, H, Remortel, NV, Österberg, K, CDF Collaboration 2006, 'Measurement of the Ratios of Branching Fractions \(B(B_{s0}^+ \rightarrow \pi^+ \eta \pi^-)B(B_{s0}^+ \rightarrow \pi^+ \eta \pi^-)B(B_{s0}^+ \rightarrow \pi^+ \eta \pi^-)\)', Physical Review Letters, vol 96, no. 19, pp. 191801.


Abulencia, A, Mäki, T, Mehtälä, P, Orava, R, Saarikko, H, Remortel, NV, Österberg, K, CDF Collaboration 2007, Measurement of the Ratios of Branching Fractions B(B^0→D^0→J/ψK^0 →K^0π^0) and B(B^0→D^0→J/ψK^0→K^0π^0) in p anti-p collisions at sqrt(s) = 1.96 TeV, Physical Review Letters, vol 98, no. 6, pp. 061802.


International Evaluation of Research and Doctoral Training at the University of Helsinki

RCMSER/Lavonen


2009


RCMSE/Lavonen


Aaltonen, T, Mehtala, P, Orava, R, Maki, T, Saarikko, H, Osterberg, K, CDF Collaboration 2010,’Search for Pair Production of Supersymmetric Top Quarks in Dilepton Events from pp Collisions at \( \sqrt{s}=1.96 \) TeV,’ *Physical Review Letters*, vol 104, no. 25, pp. 251801.


Aaltonen, T, Mehtala, P, Orava, R, Saarikko, H, Osterberg, K, CDF Collaboration 2010,’Search for new color-octet vector particle decaying to t \( \bar{t} \) in p \( \bar{p} \) collisions at \( \sqrt{s}=1.96 \) TeV,’ *Physical Review Letters*, vol 104, no. 15, pp. 151801.


Aksela, MK 2010,’Evidence-based teacher education: becoming a lifelong research-oriented chemistry teacher?’, *Chemistry Education Research and Practice*, vol 11, no. 2, pp. 84-91.


**A2 Review in scientific journal**

2006


**A3 Contribution to book/other compilations (refereed)**

2005
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

RCMSER/Lavonen


Laajamies, A., Akosta, M. 2007, 'Perusopetuksen oppilaiden käsityksiä kemian teknologiasta', Uusia lähestymistapoja kemian opetuksen perusopetuksesta korkeakouluihin, Opetushallitus, Helsinki, pp. 82-86.


Sala, S. 2007, 'Kemian ja kemian oppimiseen liittyvien tekniikoiden ja kemian oppimiseen liittyvien teknologioiden, Opettajankoulutuksen muuttuvat rakenteet, Turun opettajankoulutuslaitos, Turku, pp. 128-137.


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RCMSER/Lavonen


2009


Arkipäivän kemian, kokeellisuus ja työympäristö kemian opetuksessa peruskouluksesta korkeakouluihin, Kemian opetuksen keskus, Helsinki, pp. 17-22.


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RCMSER/Lavonen


2007

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

RCMSER/Lavonen


Tala, ST 2007, 'Unified View of Science and Technology Education: Technoscience and Technoscience Education', in IHPS 9 Conference: online papers.


2008


25


2010

Ahtineva, A, Ahtineva, Aija & Aksela, Maija 2010, Research-Based Chemistry Teacher Education in Finland,


Laherto, A 2010, 'Meanings of nanoscale science and technology regarding scientific and technological literacy', in Innovation in Science and Technology Education: Research, Policy, Practice.


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010


2006

2007


2008


2009


2010

B2 Contribution to book/other compilations (non-refereed)

2005

2007


2009

Aksela, M, Pernaa, J 2009, Arkkipäivän kemia, kokeellisuus ja työturvallisuus kemian opetuksessa perusopetuksesta korkeakouluihin, Kemian opetuksen keskus, Helsinki, pp. 3.


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

RCMSE/ Lavonen

2010

B3 Unrefered article in conference proceedings

2005

2006

2008
Gedvics, J, Lavonen, J 2008, 'Attitude to school science as an indicator for students' classification within research in science didactics', in Research in didactics of the science: monograph, pp. 56-57.
Laherto, A 2008, 'Public understanding about nanoscience and nanotechnology in relation to scientific literacy', in What is scientific and technological literacy in contemporary society and how might we educate people for it?: Preparatory position papers, pp. 5-7.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RCMSE/Lavonen

2009
Lavonen, J 2009, ‘Students’ interest and motivation in science learning: reflections based on two European projects’, in International Conference on Science Education in Europe: Jan 5-7, 2009, Taipei, Taiwan, Graduate Institute of Science Education, National Taiwan Normal University: [proceedings], pp. 33-39.

2010

C1 Published scientific monograph

2007

C2 Edited book, compilation, conference proceeding or special issue of journal

2005

2006

2007

2008
Pehkonen, E, Ahtee, M, Lavonen, J (eds) 2008, How finns learn mathematics and science, Sense, Rotterdam.
2008

2009

2010

D1 Article in professional journal
2005


2006


2007

2008


2007
Tala, S 2007, ‘”Mistä on menestyväna kemian opettaja?”’, Dimensio, vol 71, no. 5, pp. 38-44.

2008

2009
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

Lavonen


2010

Aksela, M 2010, 'LUMA Sanomat iloksi ja hyödyksi kaikille!', LUMA.fi Sanomat.


D4 Published development or research report

2007

2009

2010

D5 Text book or professional handbook or guidebook or dictionary

2005


2006


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

RCMSER/Lavonen


2009


2010


INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010


E1 Popular article, newspaper article

2005

2006

2007

2008

2009

2010

E1 Popular contribution to book/other compilations

2005
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010


E2 Popular monograph

2010

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RCMSE/Lavonen

1 Analysis of activities 2005-2010

Associated person is one of Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi, Markku Sakari Hannula, Markku.Hannula@helsinki.fi, Erkki Pehkonen, Erkki.Pehkonen@helsinki.fi, Kalle Jussi, Kalle.Jussi@helsinki.fi, Heikki Korpela@helsinki.fi, Anu Lane, Anu.Lane@helsinki.fi, Jarkko Juhani Lampsaari, jarkko.lampsaari@helsinki.fi, Anna Uttio, Anna.Uttio@helsinki.fi, Anni Loskomea, anni.loiscomea@helsinki.fi, Tiina Korhonen, tiina.korhonen@helsinki.fi, Heimo Saarela, Heimo.Saarela@helsinki.fi, Jouni Kossinen, jouni.kossinen@helsinki.fi, Sari Talo, sari.talo@helsinki.fi, Antti Lahermo, Antti.Lahermo@helsinki.fi, Terhi Katariina Mäntylä, terhi.mantyla@helsinki.fi, Sharareh Majid, sharareh.majidi@helsinki.fi, Maija Katarina Aksela, Maija.Aksela@helsinki.fi, Greta Marianne Tikkanen, Greta.Tikkanen@helsinki.fi, Veli-Matti Vesterinen, Veli-Matti.Vesterinen@helsinki.fi, Johannes Permse, johannes.permsse@helsinki.fi, Juhana Oikkonen, Juhana.Oikkonen@helsinki.fi, Mika Koskenoja, Mika.Koskenoja@helsinki.fi, Mika-Kaisa Apsila, mika.apsila@helsinki.fi, Leena Heinola, leena.heinola@helsinki.fi, Liisa Mitja Närvi, liisa.narvi@helsinki.fi

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<tr>
<td>Prices and awards</td>
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<tr>
<td>Editor of research journal</td>
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<tr>
<td>Editor of research anthology/collection/conference proceedings</td>
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<td>Peer review of manuscripts</td>
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<td>Editor of communication journal</td>
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<td>Editor of series</td>
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<td>Participation in radio programme</td>
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<td>Participation in interview for web based media</td>
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2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi
Supervision of doctoral thesis, Jari Matti Juhani Lavonen, 01.01.2008 → 01.06.2008, Sweden
Supervisor of PhD thesis, Jari Matti Juhani Lavonen, 01.01.2009 → 15.01.2011, Finland

Erkki Pehkonen, Erkki.Pehkonen@helsinki.fi
Supervision of doctoral thesis, Erkki Pehkonen, 01.01.2007 → 31.12.2007, Finland

Anu Laine, Anu.Laine@helsinki.fi
väitöskirjan ohjaaminen, Jari Lakka, Anu Laine, 2003 → ...
väitöskirjan ohjaaminen, Kirsti Hoskonen, Anu Laine, 2019 → ...
väitöskirjan ohjaaminen, Inka Miettinen, Anu Laine, 2010 → ...
väitöskirjan ohjaaminen, Sanna Forsström, Anu Laine, 2010 → ...

Jarkko Juhani Lampiselkä, jarkko.lampiselka@helsinki.fi
Supervision of Doctoral Thesis: Marja Taskinen, Jarkko Juhani Lampiselkä, 2009 → ..., Finland

Anna Uitto, Anna.Uitto@helsinki.fi

Ismo Koponen, Ismo.Koponen@helsinki.fi
Supervision of doctoral thesis, Ismo Koponen, 01.01.2007 → 31.12.2007, Finland

Maija Kataarina Aksela, Maija.Aksela@helsinki.fi
Väitöskirjan ohjaus, Maija Kataarina Aksela, 2004 → 2010

Prizes and awards

Maija Kataarina Aksela, Maija.Aksela@helsinki.fi
Vuoden matematiikan arvokkain opettaja, Maija Kataarina Aksela, 1996 → ...
Vuoden lounaanopa, Maija Kataarina Aksela, 2005 → ...
Global Best Awards 2008 -kunniamaininta, Maija Kataarina Aksela, 03.09.2008
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Naisen teko-kunniamaininta, Maija Katarina Aksela, 13.04.2008
Tiedonjakoinen virkapiiripalkinto, Maija Katarina Aksela, 09.04.2009
J.V.Snellmannin tiedonjakoinen virkapiiripalkinto, Maija Katarina Aksela, 26.03.2010

Veli-Matti Vesterinen , Veli-Matti.Vesterinen@helsinki.fi
State Award for Public Information, Veli-Matti Vesterinen, 2009

Juha Oikkonen , Juha.Oikkonen@helsinki.fi
Magister Bonus, Juha Oikkonen, 2007

Editor of research journal

Jari Matti Juhani Lavonen , Jari.Lavonen@helsinki.fi
Computers &amp; Education, Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2006, Netherlands
Member of the Editorial Board of the Eurasia Journal of Mathematics, Science and Technology Education, Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2010, Turkey
Member of the Editorial Board of the Natural Science Education, Jari Matti Juhani Lavonen, 01.01.2006 → 31.12.2009, Lithuania
Member of International Program Committee for the International Conference: Didactics of Science: Today and Tommorrow: Riga Teacher Training and Educational Management Academy, Riga, Latvia, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2007, Latvia
Member of the Editorial Board of the Nordic Studies in Science Education, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2010, Norway

Markku Sakari Hannula , Markku.Hannula@helsinki.fi
Educational Studies in mathematics, Markku Sakari Hannula, 01.01.2005 → 31.12.2005, United Kingdom
For the Learning of Mathematics, Markku Sakari Hannula, 01.01.2005 → 31.12.2005, Canada
Educational Studies in mathematics, Markku Sakari Hannula, 01.01.2009 → 31.12.2009, United Kingdom
International Journal of Science and Mathematics Education, Markku Sakari Hannula, 09.05.2009 → ...
Research in Mathematics Education, Markku Sakari Hannula, 09.05.2009 → ...

Erkki Pehkonen , Erkki.Pehkonen@helsinki.fi
Themes in Education, Erkki Pehkonen, 01.01.2005 → 31.12.2005, Greece
Zentralblatt für Didaktik der Mathematik, Erkki Pehkonen, 01.01.2005 → 31.12.2005, Germany
Journal for Research in Mathematics Education, Erkki Pehkonen, 01.01.2006 → 31.12.2006, United States
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Nordic Studies in Mathematics Education, Erkki Pehkonen, 01.01.2006 → 31.12.2006, Finland
Psychology of Mathematics Education, Erkki Pehkonen, 01.01.2006 → 31.12.2006, Czech Republic
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Teaching Mathematics and Computer Science, Erkki Peikonen, 01.01.2007 → 31.12.2007, Hungary
Zentralblatt für Didaktik der Mathematik, Erkki Peikonen, 01.01.2007 → 31.12.2007, Germany
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Dimensio, Suomi, Erkki Peikonen, 01.01.2008 → 31.12.2008, Finland
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Zentralblatt für Didaktik der Mathematik, Erkki Peikonen, 01.01.2008 → 31.12.2008, Germany
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Journal of Chemical Education, Jarkko Juhani Lampiselkä, 01.01.2004 → 31.12.2009, United States
Dimensio, Jarkko Juhani Lampiselkä, 01.01.2007 → 31.12.2007, Finland
Heimo Saarikko, Heimo.Saarikko@helsinki.fi
Journal of Baltic Science Education, Heimo Saarikko, 01.01.2007 → 31.12.2007, Lithuania
Verkkolehti Luova, LUMA-keskus, Heimo Saarikko, 01.01.2008 → 31.12.2008, Finland
Ismo Koponen, Ismo.Koponen@helsinki.fi
Science and Education, Ismo Koponen, 01.01.2005 → 31.12.2005
Surface Science, Ismo Koponen, 01.01.2005 → 31.12.2005
Mika Koskenoja, Mika.Koskenoja@helsinki.fi
Archimedes, Mika Koskenoja, 2002 → ..., Finland
Editor of research anthology/collection/conference proceedings

Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi


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Peer review of manuscripts

Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi


ICALT 2006, Jari Matti Juhani Lavonen, 01.01.2006 → 31.12.2006, Netherlands


Proceedings of EDUCATION OF CONTEMPORARY SOCIETY, Riga Teacher Training and Educational Management Academy, 6-8 APRIL 2006 Riga, LATVIA, Jari Matti Juhani Lavonen, 01.01.2006 → 31.12.2006, Latvia


Tutkimusperustainen opettajankoulutus ja kestävä kehitys: Ainedidaktinen symposiumi 3.2.2006 Helsingissä, Jari Matti Juhani Lavonen, 01.01.2006 → 31.12.2006, Finland

Mathematik und naturwissenschaftlichen Unterrichtsbeauftragten Oulun tutkimuksen päivien proceedings, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2007, Finland

Member of the Editorial Board of the Eurasia Journal of Mathematics, Science and Technology Education, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2008, Turkey

Member of the Editorial Board of the Nordic Studies in Science Education, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2010, Norway


Referees for the 10th IASTED International Conference on Computers and Advanced Technology in Education –CATE 2007, Beijing, China – Globalization of Education Through Advanced Technology, October 8 - 10, 2007, Jari Matti Juhani Lavonen, 01.03.2007 → 15.03.2007, China


Evaluation of a manuscript of Psychological reports perceptual & motor skills, Jari Matti Juhani Lavonen, 2010 → ...

Evaluation of a manuscript submitted to the Science Education International (SEI), Jari Matti Juhani Lavonen, 23.11.2010

Evaluation of a manuscript, Education Research International -journal, Jari Matti Juhani Lavonen, 2010, United States

Evaluation of a manuscript, Science&Education., Jari Matti Juhani Lavonen, 2010

Kalle Juuti, Kalle.Juuti@helsinki.fi

Journal of the European Teacher Education Network, Kalle Juuti, 2010

Nordic studies in Science education, Kalle Juuti, 2010, Norway

Heidi Krzywacki, Heidi.Krzywacki@helsinki.fi
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Evaluation of manuscripts submitted to the PME conference, Heidi Krzywacki, 2010
Referee work (Journal of European Teacher Education Network), Heidi Krzywacki, 2010

Anu Laine , Anu.Laine@helsinki.fi
Congress of the European Society for Research in Mathematics Education, vertaisarvioijana toimiminen, Anu Laine, 2010
Journal of European Teacher Education Network, arviojana toimiminen, Anu Laine, 2010 → ...

Anna Ultto , Anna.Ultto@helsinki.fi
Suomen ympäristö, Anna Ultto, 15.11.2005 → 31.12.2005, Finland
Environmental Education Reasearch, Anna Ultto, 2010

Ismo Koponen , Ismo.Koponen@helsinki.fi
Science &amp; Education, in Editorial Board, Ismo Koponen, 2009 → ...
Terhi Katarina Mäntylä , terhi.mantyla@helsinki.fi
Matematiikan ja luonnontieteiden opetuksen tutkimuksen päivät, Terhi Katarina Mäntylä, 14.10.2010 → 15.10.2010, Finland

Maija Katarina Aksela , Maija.Aksela@helsinki.fi
The monograph "Learning with understanding in the chemistry classroom", Maija Katarina Aksela, 25.05.2010 → 31.08.2010

Veli-Matti Vesterinen , Veli-Matti.Vesterinen@helsinki.fi
Science &amp; Education, Veli-Matti Vesterinen, 2010 → ...

Johannes Pernaa , johannes.pernaa@helsinki.fi
Arkipäivän kemia, kokeellisuus ja työntavallius kemian opetuksessa perusopetuksesta korkeakouluihin - IV Valtakunnalliset kemian opetukseen päivät, Johannes Pernaa, 01.06.2009 → 15.12.2009, Finland
Tutkiva lähestymistapa kemian opetukseen - V Valtakunnalliset kemian opetukseen päivät -symposiumikirja, Johannes Pernaa, 01.06.2010 → 07.12.2010, Finland

Juha Oikkonen , Juha.Oikkonen@helsinki.fi
Reviewing articles for NCMJ, Juha Oikkonen, 2009 → 2010

Mika Koskenoja , Mika.Koskenoja@helsinki.fi
Advances in Applied Clifford Algebras, Mika Koskenoja, 2006, Switzerland

Editor of communication journal
Kalle Juuti , Kalle.Juuti@helsinki.fi
Tomiluskunnan jäsen, Kalle Juuti, 2008 → 2010
Antti Laherto , Antti.Laherto@helsinki.fi
LUMA Sanomat, Antti Laherto, 2010 → ..., Finland

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KemiaUutiset -kreakauli, Maija Katarina Aksela, 2009 → ...
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LUMA-uutiset verkkolehti, Maija Katarina Aksela, 08.2009 → 05.2010

Veli-Matti Vesterinen , Veli-Matti.Vesterinen@helsinki.fi
Editor-in-chief of Luova, Veli-Matti Vesterinen, 2007 → ...
Editor-in-chief of MyScience, Veli-Matti Vesterinen, 2010 → ..., Finland

Mika Koskenoja , Mika.Koskenoja@helsinki.fi
Matematiikkalehti SoIn, Mika Koskenoja, 1998 → 2007, Finland
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Matematiikanlahti Solmu, Mika Koskenoja, 2008 → …, Finland

Editor of series
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Arkipäivän kemia, kokeellisuus ja työntovaltaisuus kemian opetuksessa perusopetuksessa korkeakouluihin - IV Valtakunnalliset kemian opetuksen päivät, Johannes Pernaa, 15.12.2009, Finland
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Mika Koskenoja, Mika.Koskenoja@helsinki.fi
Annales Academiae Scientiarum Fennicae Mathematica, Mika Koskenoja, 01.09.2006 → …, Finland
Annales Academiae Scientiarum Fennicae Mathematica Dissertations, Mika Koskenoja, 01.09.2006 → …, Finland

Editor of special theme number
Ismo Koponen, Ismo.Koponen@helsinki.fi
Entropy, in Editorial Board, Ismo Koponen, 2010 → …
Entropy: Advances in Thermodynamics, special issue, Ismo Koponen, 2010 → …
Science &amp; Education: Nordic Symposium Special Issue, Ismo Koponen, 2010 → …

Assessment of candidates for academic posts
Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi
Evaluation of competence of Anita Kärner PhD for a Senior Research Fellow of Curriculum Studies, Tartu University, Jari Matti Juhani Lavonen, 04.12.2010, Estonia
Evaluation of the Scientific Expertise of PhD Shu-Nu Chang Rundgren for a position of a docent in science education, Jari Matti Juhani Lavonen, 2010, Sweden
Evaluation of the scientific expertise for a position of a docent, Jari Matti Juhani Lavonen, 2010, Finland
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Maija Katriina Aksela, Maija.Aksela@helsinki.fi
LUMA-keskuksen koordinaattorin valintaryöryhmä, Maija Katriina Aksela, 11.2010 → …

Membership or other role in review committee
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Evaluation of the PhD programme in education at Kristianstad University College, Sweden, Jari Matti Juhani Lavonen, 2010, Sweden
Evaluation of the PhD programme in education at Malmö University College, Sweden, Jari Matti Juhani Lavonen, 2010, Sweden

Mika Koskenoja, Mika.Koskenoja@helsinki.fi
Self evaluation of governance of the teaching activities, Mika Koskenoja, 02.2008, Finland

Membership or other role in research network
Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi
Director of the Finnish Graduate School of Mathematics, Physics and Chemistry Education, Jari Matti Juhani Lavonen, 01.01.2010 → 30.12.2010, Finland
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Matematiikan oppimaisuuskeuksen tutkimuskeskuksen uutiskirje / Suomessa, Anu Laine, 2004 → 2011
VRIMO (virtuaalinen monialaisen opinnoinen) tutkimusryhmän jäsen, Anu Laine, 2009 → …
Maija Katriina Aksela, Maija.Aksela@helsinki.fi
Member of the Editorial Board of Eurasian Journal of Physics and Chemistry Education, Maija Katriina Aksela, 2009 → …, Turkey
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EMS Summer schools in pure and applied mathematics, Mika Koskenoja, 2004 → 2006
Geometric Analysis and Mathematical Physics, Mika Koskenoja, 09.2004 → 12.2007, Finland
EMS Summer schools in pure and applied mathematics Second series, Mika Koskenoja, 2006 → 2008

Membership or other role in national/international committee, council, board

Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi
Mathematical and luonnontieteiden opetukseen tutkimusseura ry, Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2006, Finland
Mathematical and luonnontieteiden opetukseen tutkimusseura, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2007, Finland
Finnish graduate school of mathematics, physics and chemistry education, Jari Matti Juhani Lavonen, 01.01.2008 → 31.12.2009, Finland

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Finnish graduate school of mathematics, physics and chemistry education, Jari Matti Juhani Lavonen, 01.01.2008 → 31.12.2009, Finland

Member of a national group, responsible for assessing learning outcomes in physics and chemistry, Jari Matti Juhani Lavonen, 2010 → 2011, Finland
Member of the PISA 2015 Science Expert Group, Jari Matti Juhani Lavonen, 01.12.2010 → 30.12.2015, France

Markku Sakari Hannula, Markku.Hannula@helsinki.fi
MATHEMATIKAAN JA LUONNONTETEIDEN OPETUKSEEN TUTKIMUSSEURA ry, Markku Sakari Hannula, 01.01.2005 → 31.12.2010, Finland

Nordic society for Research in Mathematics Education (NoRME), Markku Sakari Hannula, 2008 → 2009

Erkki Pekkonen, Erkki.Pekkonen@helsinki.fi
Matematiikan siirroksen opetukseen tutkimusryhmä, Erkki Pekkonen, 01.01.2007 → 31.12.2007, Finland
NORMA-08 International Program Committee, Erkki Pekkonen, 01.01.2007 → 31.12.2007, Denmark
NORMA-08 International Program Committee, Erkki Pekkonen, 01.01.2008 → 31.12.2008, Denmark

Kalle Juuti, Kalle.Juuti@helsinki.fi
Member of the scientific committee of the IADIS e-learning 2005 conference within the IADIS virtual Multi Conference on Computer Science and InformationSystems (MCCSI 2005) conference, Kalle Juuti, 2005 → ...
Tutkimusseuran sihteeri, Kalle Juuti, 2009 → 2011, Finland

Heidi Krzywacki, Heidi.Krzywacki@helsinki.fi
JURE organising committee of the pre-conference for junior researchers, EARLI 2009, Heidi Krzywacki, 2008 → 2009, Netherlands

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LUMA-koskun johtoryhmän varajäsen, Anu Laine, 2010

Jarkko Juhani Lampiselkä, Jarkko.Lampiselkä@helsinki.fi
IADIS Multi Conference on Computer Science and Information Systems 2007 Member of the Committee, Jarkko Juhani Lampiselkä, 01.01.2007 → 31.12.2007
EU TRAIN kokouksen järjestelytoimikunnan puheenjohtaja (tammiku 2008 ja syyskuu 2008), Jarkko Juhani Lampiselkä, 01.01.2008 → 30.09.2008, Finland

Anna Ulto, Anna.Ulto@helsinki.fi
LUMA-kusku, Helsingin yliopisto, Anna Ulto, 01.01.2005 → 31.12.2005, Finland

European Molecular Biology Organization (EMBO), workshop rapportoitti, Anna Ulto, 01.01.2006 → 31.12.2006, Germany
LUMA-keskuksen suunnitteluryhmä. LUMA-keskus on Helsingin yliopiston matemaattis-luonnontieteellisen tiedekunnan koordinoima sateenvarjo-organisaatio koulujen, yliopistojen ja elinkeinoelämän yhteistyölle, jonka tavoitteena on luonnontieteiden , Anna Uitto, 01.01.2007 → 31.12.2007, Finland

Nordiskt nätverk i miljöpedagogik. Ett tvärvetenskapligt forskar- och lärarnätverk inom miljö- och utomhuspedagogik samt hållbar utveckling vid lärarutbildningar i Finland, Sverige, Norge, Danmark och Island. Opettajankoulutajien pohjoismainen , Anna Uitto, 01.01.2007 → 31.12.2007, Finland


Heimo Saarikko , Heimo.Saarikko@helsinki.fi

2008

The Spring Seminar of the Finnish Graduate School of Mathematics, Physics and Chemistry Education 9.-13.6.2008, Helsinki , Ismo Koponen , Ismo.Koponen@helsinki.fi

The Role and Impact of the Philosophy of Science in Practice on Designing Approaches to Higher Science Education, organizer of the Symposium, Ismo Koponen, 01.01.2007 → 31.12.2007, Netherland

CMMC 2008 Concept mapping connecting educators Conference, Program Committee, Ismo Koponen, 01.01.2006 → 31.12.2008


International History and Philosophy in Science Teaching IHPST, member of the nominating board, Ismo Koponen, 01.01.2008 → 31.12.2008

Maija Katariina Aksela , Maija.Aksela@helsinki.fi

The Steering Group of Chemistry Today Project, Maija Katarina Aksela, 1996 → ...

Coordinating, Maija Katarina Aksela, 2003 → 2009

Director, Maija Katarina Aksela, 01.01.2010 → ...

Kansainvälinen henkilövuo 2011 ohjausryhmä, Maija Katarina Aksela, 2010 → ...

Millennium Youth Camp valintaryhmä, Maija Katarina Aksela, 2010 → ...

National LUMA Advisory Board (Kansallinen LUMA-neuvottelukunta), Maija Katarina Aksela, 01.01.2010 → ...

The ALLEA Working Group on Science Education, Maija Katarina Aksela, 2010 → ...

The Steering Group of the Millennium Youth Camp (MY Camp), Maija Katarina Aksela, 01.06.2015 → ...

Juha Okkonen , Juha.Okkonen@helsinki.fi

Jäsen ICMI-järjestön "survey teamissa" jonka aiheena alku vaiheen yliopisto-opetuksen tilan selvittäminen ICME-11 kongressia varten, Juha Okkonen, 01.01.2007 → 31.12.2007

Mika Koskenoja , Mika.Koskenoja@helsinki.fi

Publication Board of the Finnish Academy of Science and Letters, Mika Koskenoja, 04.06.2006 → ..., Finland

Membership or other role in public Finnish or international organization

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Luma-keskuksen johtoryhmä, Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2009, Finland

Member of the steering group of the project Evaluering av strategiplanen RealFag, Naturligvis" which is organised by the Norwegian Utdanningsdirektoratet, Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2006, Norway

Oppilaan ja opintojen ohjauksen kehittämishankkeen johtoryhmä (opetushalitus), Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2006, Finland

Tiedekeskus Heurekan Tiede- ja teknologiapuolustus neuvottelukunnan jäsenyys, Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2009, Finland
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Ulkomaisten korkeakoulututkintojen ammatillinen tunnustaminen työryhmä (opetushallitus), Jari Matti Juhani Lavonen, 01.01.2005 → 31.12.2006, Finland

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Suomen PISA tutkimuksen johtoryhmä, Jari Matti Juhani Lavonen, 01.01.2006 → 31.12.2008, Finland

Member of the group of the project: Utvärdering av de 16 nationella forskarskolorna, Högskoleverket, Jari Matti Juhani Lavonen, 01.09.2007 → 31.12.2008, Sweden

Yliopistututkintolautakunnan apujäsen, Jari Matti Juhani Lavonen, 01.01.2007 → 31.12.2009, Finland

Head of the Department, Jari Matti Juhani Lavonen, 01.01.2010 → 30.12.2010, Finland

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Espoon opetuslautakunnan jäsen, Markku Sakari Hannula, 2008 → 2011, Finland

Kunttiallisen Opetus- ja kulttuuriasiain neuvottelukunnan jäsen, Markku Sakari Hannula, 2009 → 2011, Finland

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Opetushallitus, asiantuntijatyöryhmän jäsen, syksyllä 2006 järjestettävän netijännän vuosiluokan jälkeen toteutettava ympäristö- ja luonnonlajioiden kansallista arvokunta, Kalle Juuti, 2006 → ..., Finland

NY Yrittäjyyskasvatuksen poliku-projectiet, Omaa yritysmme: n jäsen, (EU:n ja Suomen vallon rahoittama harke), Kalle Juuti, 2008 → 2010, Finland

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LUMA-keskuksen suunnitteluryhmä, Jarkko Juhani Lampiselkä, 01.01.2004 → 31.12.2009, Finland

Opetushallitus, Ulkomaisten korkeakoulututkintojen ammatillinen tunnustaminen, alatyöryhmä, Jarkko Juhani Lampiselkä, 01.01.2005 → 31.12.2009, Finland

Yliopistututkintolautakunta, Opetusministeriö, Jarkko Juhani Lampiselkä, 01.01.2006 → 31.12.2009, Finland

Heikinien normalisyysen johtokunta, Jarkko Juhani Lampiselkä, 2008 → 2009, Finland

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Helsingin yliopisto, LUMA-keskus, opettajien täydennyskoulutus, Luokion ympäristötekniologian täydennyskoulutuskurssit, LUMA-keskus ja Bio- ja ympäristöteknologian laitos, Anna Ulitto, 08.06.2005 → 19.06.2005, Finland

Helsingin yliopiston LUMA-keskus, suunnitteluryhmä, Anna Ulitto, 01.01.2006 → 31.12.2006, Finland

Asiantuntijatehtävät, Anna Ulitto, 2009 → 2011

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LUMA-keskus, johtaja ja johtoryhmän puheenjohtaja, Heimo Saarikko, 01.01.2006 → 31.12.2006, Finland

Helsingin yliopisto, Kielikeskuskeskuksen johtokunta, Heimo Saarikko, 01.11.2007 → 30.11.2007, Finland

Helsingin yliopisto, Kielikeskuskeskuksen johtokunta, varajäsen, Heimo Saarikko, 01.11.2007 → 30.11.2007, Finland

Helsingin yliopisto, Luonnontieteellisen kuvakirjaston johtokunta, Heimo Saarikko, 01.01.2007 → 31.12.2007, Finland

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LUMA-keskuksen johtaja ja johtoryhmän puheenjohtaja, Heimo Saarikko, 01.01.2007 → 31.12.2007, Finland

Opetushallitus, Matematiikan ja luonnonlaitosten neuvoajokunta, Heimo Saarikko, 01.01.2007 → 31.12.2007, Finland

Physics Olympics, leader of the Finnish team, Heimo Saarikko, 12.07.2007 → 22.07.2007, Iran

Yliopistututkintolautakunta, Heimo Saarikko, 01.01.2007 → 31.12.2007, Finland

Helsingin yliopisto, Luonnontieteellisen kuvakirjaston johtokunta, varapuheenjohtaja, Heimo Saarikko, 01.01.2008 → 31.12.2008, Finland

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Helsingin yliopiston Kollegi, jäsen, Heimo Saarikko, 01.01.2008 → 31.12.2008, Finland

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RCMSEER/Lavonen

LUMA-keskuksen johtaja, Helmo Saarikko, 01.01.2008 → 31.12.2008, Finland
Opetushallitus, Matematiikan ja luonnontieteiden neuvottelukunta, Helmo Saarikko, 01.01.2008 → 31.12.2008, Finland

Antti Laherto , Antti.Laherto@helsinki.fi

Maija Katarina Aksela, Maija.Aksela@helsinki.fi
Opettajakoulutuksen neuvottelukunnan aineoppetapakoalutuksen kehittämisryhmän jäsen, Maija Katarina Aksela, 2007 → ...
Verkkoelit Luovan neuvottelukunta, Maija Katarina Aksela, 01.01.2007 → ...
Chemistry ab Gadolin Advisory Board (Kemianakkia Gadolinin ohjausryhmä), Maija Katarina Aksela, 2008 → ...
Member of the Board of Directors, Research Foundation of the University of Helsinki (Helsingin yliopiston Tiedesäätiön hallitus), Maija Katarina Aksela, 2009 → ...
Tätä tilannetta yleiskeskukset toimintaa valmistaneen työryhmä, Maija Katarina Aksela, 29.03.2009 → 31.12.2009
LUMA Sanomat -verkkoelit -neuvottelukunta, Maija Katarina Aksela, 23.08.2010 → ...
Member of the Studia Generalia Advisory Board (Studia Generalia -toiminnan liestelimen ohjausryhmä), Maija Katarina Aksela, 2010 → 2013
MyScience -verkkoelit -neuvottelukunta, Maija Katarina Aksela, 19.03.2010 → ...
The Advisory Board of the Centre for Chemistry Education, Kemia, Maija Katarina Aksela, 19.10.2010 → ..., Finland
The Working Group of the LUMA Centre (LUMA-keskuksen yhteistyöryhmä), Maija Katarina Aksela, 2010 → ...
Thematic working group on maths science and technology, Maija Katarina Aksela, 15.10.2010 → ..., Belgium

Johannes Pernaa , johannes.pernaa@helsinki.fi
Kerriat laitoksen liitosneuvoston varajäsen 2010, Johannes Pernaa, 01.01.2010 → ..., Finland

Juha Oikkonen, Juha.Oikkonen@helsinki.fi
YTL matematiikan sensori, Juha Oikkonen, 01.01.2005 → 31.12.2005
Jäsennys tiedekeskus Heuren tekoopetukseen neuvottelukunnassa, Juha Oikkonen, 01.01.2006 → 31.12.2006, Finland
YTL matematiikan sensori, Juha Oikkonen, 01.01.2006 → 31.12.2006, Finland
Jäsennys tiedekeskus Heuren tekoopetukseen neuvottelukunnassa, Juha Oikkonen, 01.01.2007 → 31.12.2007, Finland
YTL matematiikan sensori, Juha Oikkonen, 01.01.2007 → 31.12.2007, Finland

Mika Koskenoja , Mika.Koskenoja@helsinki.fi
Internet home page committee, Mika Koskenoja, 2000 → 2005
Committee of developing teaching activities, Mika Koskenoja, 04.2007 → ..., Finland
Occupational safety and health committee in Kumpu Campus, Mika Koskenoja, 2010 → ..., Finland

Membership or other role of body in private company/organisation

Kalle Juuti, Kalle.Juuti@helsinki.fi
Kymenlaakson maakuntarahaston hoitolautakunnan jäsen, Kalle Juuti, 2006 → ...
Member of the steering group, Kalle Juuti, 2008 → 2010, Finland

Jarkko Juhani Lampiselkä, jarkko.lampiselka@helsinki.fi
MAOL r.y. (Matemaattisten aineopetajien liitto), luonnontieteet toimikunta, Jarkko Juhani Lampiselkä, 2004 → 2010, Finland
MAOL ry, Fysikka ja kemian toimikunta, Jarkko Juhani Lampiselkä, 01.01.2006 → 31.12.2007, Finland
MAOL ry. (Matemaattisten aineopetajien liitto), luonnontieteet toimikunta, Jarkko Juhani Lampiselkä, 2008 → 2009, Finland

Anna Ultto, Anna.Ultto@helsinki.fi
Nordiskt nätverk i miljöpedagogik. Ett tvärvetenskapligt forskar- och lärarnätverk inom miljö- och utomhuspedagogik vid lärarutbildningar i Finland, Sverige, Norge, Danmark och Island. Ympäristöpedagogikin pohjoismainen tutkimus- ja opetusverkosto, Anna Uitto, 01.01.2006 → 31.12.2006, Finland

Johannes Pernaa, johannes.pernaa@helsinki.fi

Yksityisen sektorin yrityksen hallituksen puheenjohtaja, Johannes Pernaa, 07.05.2010 → ..., Finland

Juha Oikkonen, Juha.Oikkonen@helsinki.fi

Dimensiolehden toimittajankunnan jäsenyys, Juha Oikkonen, 01.01.2005 → 31.12.2005

Dimensiolehden toimittajankunnan jäsenyys, Juha Oikkonen, 01.01.2006 → 31.12.2009, Finland

Dimensiolehden toimittajankunnan jäsenyys, Juha Oikkonen, 01.01.2007 → 31.12.2007, Finland

Participation in interview for written media

Jari Matti Juhani Lavonen, Jari.Lavonen@helsinki.fi

Luku-Suomi-hankkeen avausseminaari opetushallituksessa. Helsinki., Jari Matti Juhani Lavonen, 30.07.2002 → ..., Finland

Helsingin kaupungin opetusvirasto, Jari Matti Juhani Lavonen, 07.10.2004 → ..., Finland

Helsingin yliopiston Luma-keskuksen avajaiset, Jari Matti Juhani Lavonen, 28.02.2004 → ..., Finland

Matemaattisten aineiden opettajien liitto MAOL ry:n sisäissävelvöt, Jari Matti Juhani Lavonen, 02.10.2004 → ..., Finland

Matemaattisten aineiden opettajien liitto MAOL ry:n talvipäivity, Jari Matti Juhani Lavonen, 31.01.2004 → ..., Finland

Matemaattisten aineiden opettajien liitto ry:n koosteensäintä toimissaan, Jari Matti Juhani Lavonen, 01.10.2004 → ..., Finland

Interview by Vita Drejere, Latvian national daily newspaper Diena, Jari Matti Juhani Lavonen, 24.09.2010, Latvia

Interview in a Journal: Nouveau Education Magazine, No 6, Juliet 2010., Jari Matti Juhani Lavonen, 15.05.2010, France

Kalle Juuti, Kalle.Juuti@helsinki.fi

Konferenz Gender Mainstreaming und Gleichstellung in Schul und Unternehmen, Kalle Juuti, 14.05.2004 → 31.12.2011, Finland

Mirror-hankkeen välttämisseminaari, Kalle Juuti, 08.05.2004 → 31.12.2011, Finland


dieStandard.at, Kalle Juuti, 17.05.2004 → 31.12.2011, Finland

Anu Laine, Anu.Laine@helsinki.fi


Jarkko Juhani Lampiselkä, jarkko.lampiselkä@helsinki.fi

"Kvaa olla lämpimättä", Etelä-Suomen Sanomat, 16.6.2007, Jarkko Juhani Lampiselkä, 16.06.2007, Finland

"Lasten tiedepäivä Saksalainen päiväkodilla", Mof Uusi Lahti, 16.6.2007, Jarkko Juhani Lampiselkä, 16.06.2007, Finland

"Päiväkodillinen tiedemiestä", Etelä-Suomen Sanomat, 15.6.2007, Jarkko Juhani Lampiselkä, 15.06.2007, Finland

"LumiO-keskus avasi ovensa", Arkhimedes-lehti, Jarkko Juhani Lampiselkä, 27.05.2008


"Luonnonieteet kiinnostivat koululaisia", Etelä-Suomen Sanomat, 31.5.2009, Jarkko Juhani Lampiselkä, 31.05.2009, Finland

"Olta voi lähestyä myös teekkeliäisiä", artikkelit Etelä-Suomen Sanomat lehdessä, Jarkko Juhani Lampiselkä, 26.09.2009, Finland

"Tiede kiinnostivat koululaisia, Mof Uusi Lahti -lehti, Jarkko Juhani Lampiselkä, 25.09.2009, Finland

Tiedepäivä viettäbm Mukkulan peruskoululla, Etelä-Suomen Sanomat, Jarkko Juhani Lampiselkä, 19.09.2009, Finland

"Tutkijoiden yllä ennätteleviä", artikkelit Mof Uusi Lahti-lehdessä, Jarkko Juhani Lampiselkä, 30.09.2009
RCMSE/Lavonen

Anna Uitto, Anna.Uitto@helsinki.fi
Opetushallituksen täydennyssoulutus. Helsinki, Opetushallitus, Hakaniemenkatu 2, Anna Uitto, 08.03.2006 – 31.12.2011, Finland

Heimo Saarikko, Heimo.Saarikko@helsinki.fi

Ismo Koponen, Ismo.Koponen@helsinki.fi
Yliopistollinen -lehti, haastattelu, toimittaja Siina Vasama, Ismo Koponen, 01.01.2004 – 31.12.2011, Canada
Workshop on Modeling, Simulation and Computational Science: Perspective from different sciences, Panel discussion, University of Helsinki, Philosophy of Science Group, Ismo Koponen, 29.11.2007 – 31.12.2011, Finland

Suvi Tala, suvi.tala@helsinki.fi

Antti Laherto, Antti.Laherto@helsinki.fi
LUOVA, muuten luonnontiedekorkeakoulut, artikkeli, Antti Laherto, 01.01.2008 – 31.12.2011, Finland

Maija Katarina Aksela, Maija.Aksela@helsinki.fi
Yliopistollinen-lehti, Maija Katarina Aksela, 01.01.2003 – 31.12.2011, Finland
Eshedramit (ko, kohta tiedexessillä esiteltävä), Maija Katarina Aksela, 01.01.2004 – 31.12.2011, Finland
Lehdet (Helsingin Sanomat, Kemia-Kemi, Yliopistollinen, Kemia-lehti, Kollekti), Maija Katarina Aksela, 01.01.2004 – 31.12.2011, Finland
Haastattelu Opettaja-lehteen, Maija Katarina Aksela, 03.12.2010

Juha Oikkonen, Juha.Oikkonen@helsinki.fi
Studies generals, Juha Oikkonen, 01.01.2000 – 31.12.2011, Finland
MAOL, syyspäivä Helsinki (Kumpula), Juha Oikkonen, 06.10.2007 – 31.12.2011, Finland

Mika Koskenoja, Mika.Koskenoja@helsinki.fi
Pokersivut.com, Mika Koskenoja, 20.10.2008, Finland

Participation in radio programme
RCMSEER/Lavonen

Veli-Matti Vesterinen , Veli-Matti.Vesterinen@helsinki.fi
Absoluuttinen totuus, Veli-Matti Vesterinen, 20.07.2010, Finland

Juha Oikkonen , Juha.Oikkonen@helsinki.fi
Matematikan aika. Löytämisen iloa matematiikasta., Juha Oikkonen, 11.08.2008
Matematikan aika. Matematiikan opiskelu yliopistossa on eri juttu, Juha Oikkonen, 07.04.2008

Participation in TV programme
Jari Matti Juhani Lavonen , Jari.Lavonen@helsinki.fi
Saksan television ohjelma Suomen PISA menestyksestä, Jari Matti Juhani Lavonen, 01.11.2005, Finland
Slovakian television pohjustalessa, Jari Matti Juhani Lavonen, 05.05.2007 → ..., Finland
Interview by Shin Soyoung, National Korean Broadcasting Company, Jari Matti Juhani Lavonen, 09.09.2010, South Korea

Markku Sakari Hannula , Markku.Hannula@helsinki.fi
TV-ohjelma. MTV 3 Huomenia Suomi, haastattelu, Markku Sakari Hannula, 28.11.2007 → ..., Finland

Anu Laine , Anu.Laine@helsinki.fi
Etelä-Korean television dokumentti suomalaisesta koulutusjärjestelmästä ja opettajankoulutuksesta, Anu Laine, 2010
Saksan television dokumentti suomalaisesta koulutusjärjestelmästä, Anu Laine, 2010

Heimo Saarikko , Heimo.Saarikko@helsinki.fi
TV-uutiset, välähdys tapahtumasta, Heimo Saarikko, 07.11.2005 → 31.12.2011, Lithuania
TV Nelonen, B-studio, haastattelu, Heimo Saarikko, 01.01.2008 → 31.12.2011, Finland

Juha Oikkonen , Juha.Oikkonen@helsinki.fi
Matematiikan haasteet, Juha Oikkonen, 2005

Participation in interview for web based media
Anu Laine , Anu.Laine@helsinki.fi
haastattelu monikulttuurisuuspäivästä yliopiston ja tiedekunnan verkkosivuille, Anu Laine, 2010
Research Group: Lavonen J

**Basic statistics**
- Number of publications (P) 103
- Number of citations (TCS) 736
- Number of citations per publication (MCS) 7.15
- Percentage of uncited publications 29%
- Field-normalized number of citations per publication (MNCS) 1.21
- Field-normalized average journal impact (MNJS) 1.73
- Field-normalized proportion highly cited publications (top 10%) 1.07
- Internal coverage .71

**Trend analyses**

**Collaboration**

**Performance (MNCS) by collaboration type**
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING
AT THE UNIVERSITY OF HELSINKI

by CWTS, Leiden University, the Netherlands

Research profile
Appendix B.b.

Maria Forsman, Chief Information Specialist, DSocSc
Helsinki University Library 7.7.2011

The bibliometric analyses by Helsinki University Library (HULib)

Background: The bibliometric analyses – especially citation analyses – have raised a lot of discussion and critics among researchers in social sciences and humanities. Researchers view that bibliometric analyses are often unfair to these fields of sciences because they do not give a good enough picture of the publishing. Citation databases – Web of Science and Scopus – cover only weakly the main publications in these fields. Also, in humanities and social sciences monograph is still the main form of publishing, and it does not include in these article databases.

At the University of Helsinki, the above mentioned concerns have been taken into account in the evaluation. The Evaluation Office has ordered analyses from the Helsinki University Library (HULib) for the participating researcher communities that are weakly represented in Web of Science. The database for the HULib analyses is TUHAT (https://tuhat.halvi.helsinki.fi/portal/en/) including all the publications that the researchers have considered important.

Based on this data, information specialists at HULib have carried out the following analyses:

1) Number of authors/publication/year as a table; a pie of authors/publication in the period 2005-2010;
2) Language of publication/year; a pie of language of publication in the period 2005-2010;
3) Articles/journal/year; journals have been compared by ISSN with the Norwegian, Australian and ERIH (2007-2008) journal ranking lists; number of articles in ranked journals;
4) Publisher/monograph type (according to TUHAT database); monographs have been compared with the Norwegian publisher ranking list. According to this, it has been counted how many monographs are published by a leading scientific publisher (2) or a scientific publisher (1).
5) Conference publications (from TUHAT database) especially in computer sciences; compared with the Australian conference ranking list.

Where relevant, some additional analyses and notes concerning the publication culture of a scientific field have been added. Overall, these analyses complement the other evaluation material and lists of the publications of the participating researcher communities.

If the publications of the RCs were less than 50 or/and the internal coverage less than 40 percentage, the WoS analyses were considered not reliable. These RCs were 58 altogether.

In addition, both Leiden and Library analyses were done to the RCs if WoS analyses covered less than 40 per cent of the peer review (A+C) publications of the RC. These RCs were 8 altogether.

The appendix includes the analyses of the RC under discussion.
### Analysis of publications by Helsinki University Library – 66 RCs altogether

#### Biological, Agricultural and Veterinary Sciences
- Luukkanen, Olavi – VITRI
- Valsta, Lauri – SUVALUE

#### Natural Sciences
- Abrahamsson, Pekka – SOFTSYS
- Kangasharju, Jussi – NODES
- Ukkonen, Esko – ALKO
- Väänänen, Jouko – HLG

#### Humanities
- Aejmelaeus, Anneli – CSTT
- Anttonen, Pertti – CMVG
- Dunderberg, Ismo – FC
- Havu, Eva – CoCoLaC
- Heikkilä, Markku – RCSP
- Heinämaa, Sara – SHC
- Henriksson, Markku – CITAR
- Janhunen, Juha – LDHFTA
- Kaja, Miika – AMNE
- Klippi, Anu – Interaction
- Knuutila, Simo – PPMP
- Koskenniemi, Kimmo – BAULT
- Lauha, Aila – CECH
- Lavento, Mika – ARCH-HU
- Lukkarinen, Ville – AHCI
- Lyytikäinen, Pirjo – GLW
- Mauranen, Anna – LFP
- Meinander, Henrik – HIST
- Nevalainen, Terttu – VARIENG
- Pettersson, Bo – ILLC
- Pulkkinen, Tuja – Gender Studies
- Pyrhönen, Heta – ART
- Ruokanen, Miikka – RELDIAL
- Saarinen, Risto – RELSOC
- Sandu, Gabriel – LMPS
- Tarasti, Eero – MusSig
- Vehmas-Lehto, Inkeri – TraST
- Östman, Jan-Ola – LMS

#### Social Sciences
- Airaksinen, Timo – PPH
- Engeström, Yrjö – CRADLE
- Granberg, Leo – TRANSURBAN
- Halla, Anne – Sociopolis
- Hautämäki, Jarkko – CEA
- Heinonen, Visa – KUMU
- Helén, Ilpo – STS
- Hukkinen, Janne – GENU
- Jallinoja, Ritta – SBII
- Kaartinen, Timo – SCA
- Kettunen, Pauli – NordSoc
- Kivinen, Markku – FCREEES
- Koponen, Juhani – DEVERLE
- Koskenniemi, Martti – ECI
- Kultti, Klaus – EAT
- Lahelma, Elina – KUFE
- Lanne, Markku – TSEM
- Lavonen, Jari – RCMSER
- Lehtonen, Risto – SocStats
- Lindblom-Yläne, Sari – EdPsychHE
- Nieminen, Hannu – MECOL
- Nuotio, Kimmo – Law
- Nyman, Göte – METEORI
- Ollikainen, Markku – ENFIFO
- Pirttilä-Backman, Anna-Maija – DYNASOBIC
- Rahkonen, Keijo – CulCap
- Roos, J P – HELPS
- Simola, Hannu – SOCE-DGI
- Sulikunen, Pekka – PosPus
- Sumelius, John – AG ECON
- Vaattovaara, Mari – STRUTSI
- Vainio, Martti – SigMe

The next appendix includes the analyses of the RC under discussion.
INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY
OF HELSINKI

30.6.2011 PJK / 19.4.2012 MF

PUBLICATION DATA 2005-2010

RC/RCMSER/Lavonen

Category 4. The research of the participating community represents an innovative opening.

Number of authors in publications/year

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81% of publications have more than one author.
% of au in publications 2005-2010

- 6 au; 90; 11 %
- 8 au; 96; 11 %
- 7 au; 126; 16 %
- 1 au; 154; 19 %
- 2 au; 145; 18 %
- 3 au; 76; 9 %
- 4 au; 64; 8 %
- 5 au; 33; 4 %
- 12 au; 7; 1 %
- 11 au; 3; 0 %
- 9 au; 3; 0 %
- 15 au; 1; 0 %
- 14 au; 1; 0 %
- 16 au; 1; 0 %
- 17 au; 1; 0 %
- 23 au; 1; 0 %
- 21 au; 1; 0 %
- 20 au; 2; 0 %
- Other; 8; 1 %
The commonest language is English (63 %), as Finnish (36 %) in the second place.
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Book publishers

Publisher ranking (based on Norwegian ranking list)

2 = leading scientific
1 = scientific
no = non-scientific or not ranked

C1 Published scientific monograph (2)
C2 Edited book, compilation, conference proceeding or special issue of journal (12)
D5 Text book or professional handbook or guidebook or dictionary (77)
E2 Popular monograph (1)

None of the 92 books has been published by a high ranked leading scientific publisher, but 53 are by a ranked scientific publisher.
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