LUMA CENTRE FINLAND

Engaging kids, youth and teachers in math, science and technology education in Finland

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WARMLY WELCOME OUR FRIENDS FROM CHINA!

KIDS AND YOUNG PEOPLE ARE IN OUR HEARTS!
OUR PROGRAM TODAY

- THE OPPORTUNITIES FOR OUR COLLABORATION
- THE NEXT STEPS FOR OUR COLLABORATION
- INTRODUCTION TO CHEMISTRYLAB GADOLIN IF TIME ([http://www.luma.fi/kemma](http://www.luma.fi/kemma))
THE OPPORTUNITIES FOR OUR LUMA COLLABORATION

- LEARNING FROM EACH OTHERS:
  - THE BEST PRACTICES IN TEACHER EDUCATION IN MATH, SCIENCE AND TECHNOLOGY
  - SOME COURSES (E.G. MOOC) TOGETHER
  - EXCHANGE OF PERSONELL, POST GRADUATE STUDENTS AND MASTER LEVEL STUDENTS

- RESEARCH COLLABORATION

- CONSULTING WORK:
  - HOW TO APPLY THE BEST PRACTICES OF THE FINNISH MODEL LUMA TO CHINA?
  - LUMA CENTRE CHINA?
WHAT IS LUMA?

- **LUMA** is a Finnish model to promote Math, Science and Technology Education since year 1996.
- It is **not** the same as the model called STEM.
- It also means **Light (Shine): The Joy of Kids’ Eyes** when they have engaged in Math, Science and/or Technology.
- The flower logo means **“Together we are more”** (our motto).
LUMA FOR ALL
connecting various fields of science from kindergarten to university

ALSO COLLABORATION WITH OTHER SCIENCES AND ART
LUMA CENTRE AT UNIVERSITY OF HELSINKI: 7 RESOURCE CENTRES

- BIOSCIENCE EDUCATION CENTRE, BIOPPOP
- CHEMISTRY EDUCATION CENTRE, KEMMA
- COMPUTATIONAL EDUCATION CENTRE, LINKKI
- GEOGRAPHICAL EDUCATION CENTRE, GEOPISTE
- MATHEMATICS EDUCATION CENTRE, SUMMAMUTIKKA
- PEDAGOCIAL CENTRE, LUMO
- PHYSICS EDUCATION CENTRE, F2K

See: http://www.helsinki.fi/luma/english/

SINCE YEAR 2003
NATIONAL LUMA CENTRE FINLAND

built with 12 universities

- AN UMBRELLA ORGANIZATION WITH 13 LUMA CENTRES
- EVERY UNIVERSITY HAS 1-2 CENTRES
- A NATIONAL STEERING GROUP
- A NATIONAL STRATEGY AND ACTIONS
- A COMMON BUDGET
- A DIRECTOR AND A COORDINATOR
- UNIVERSITY OF HELSINKI IS COORDINATING THE NETWORK
THE MAIN AIM OF THE LUMA CENTRE:
To engage children and young people from age 3 to 19 in science, technology, engineering, and mathematics and teachers at all levels in life-long professional development.

e.g. SPECIAL JIPPO - PROGRAM FOR CHILDREN FROM AGE 3 TO 6
OUR LUMA CENTRE SUPPORTS

- the aims and contents of our national new curriculum framework (all schools starts it on fall 2016)

SKILLS
Broad concept of curriculum

1. Learning and teaching methods
2. Transversal competencies
3. Cooperation
4. General values and objectives
5. Assessment for learning
6. Objectives and contents in subjects
7. Support for growth and learning
8. Pupil welfare

Source: National Board of Education/Teijo Koljonen
SOME MAIN THINGS IN OUR NATIONAL CURRICULUM FRAMEWORK

- **TO PROMOTE KIDS AS ACTIVE LEARNERS**
- **TO PROMOTE DIFFERENT COMPETENCES AND SKILLS**
  - e.g. thinking skills, discussion skills, argumentation skills, inquiry skills, programming skills
  - e.g. how to make good questions?
  - e.g. project-based learning and formative assessment
- **TO ENGAGE STUDENTS IN MATH AND SCIENCE EDUCATION**
  - e.g. phenomena-based teaching (e.g. water, climate, home)
  - e.g. programming as a part of mathematics learning
- **TEACHER’S ROLE IS LIKE A CONDUCTOR.**
Children benefit early learning of science process skills: learning outcomes, attitudes, motivation and interest are improved if children master basic science process skills at pre-school age (Sackes, 2013)

Predicting
Classifying
Communicating
Inferring
Measuring
Observing

Rezba et al, 2007
34 DEVELOPMENT PROJECTS GOING ON WITH SCHOOLS (6 TO 16 YEARS OLD)

- MATHEMATICS
  (e.g. creative problem solving; inquiry)
- SCIENCE AND ENVIRONMENT
  (e.g. contextual learning, good questions)
- TECHNOLOGY EDUCATION
  (e.g. programming, robotics)

LUMA FINLAND PROGRAMME FOR YEARS 2014-19
(RESOURCES from the Ministry of Education and Culture)
COLLABORATION IS KEY FOR SUCCESS

MOTTO: TOGETHER WE ARE MORE

LUMA

TEACHERS, TEACHERS, STUDENTS, STUDENTS, PARENTS

MINISTRY OF EDUCATION

NATIONAL BOARD OF EDUCATION

BUSINESS SECTOR

INTERNATIONAL PARTNERS

MEDIA

MUSEUMS

SCIENCE CENTRES

PEDAGOGICAL ASSOCIATIONS

RESEARCH

RESEARCHERS

TEACHERS

STUDENTS

EDUCATORS

17.5.2016 15
DESIGN-BASED RESEARCH AS A TOOL FOR PEDAGOGICAL INNOVATIONS

THEORETICAL PROBLEM ANALYSIS

- SCIENCE - LEARNING

EMPIRICAL PROBLEM ANALYSIS

GOALS FOR THE ACTIVITY

NEEDS

A PILOT MODEL AND TESTING IT AT SPECIAL SCHOOL LABS IN UNIVERSITY

RESULTS

A PEDAGOGICAL INNOVATION

E.G. A FUEL CELL ACTIVITY FOR SECONDARY LEVEL

SCIENTIFIC PAPERS

TEACHER EDUCATION
LUMAT: Scientific journal for publishing research findings & best practices

LUMAT: Research and Practice in Math, Science and Technology Education

The journal provides Finnish and international researchers and developers of math, science and technology education, and teachers from early education to universities with the possibility to publish their research and good practices. Research articles are peer-reviewed.

Languages of publication are Finnish, Swedish, and English. The abstracts of all articles will be published in all three languages.

The minimum of two issues will be published annually, including special issues dedicated to predetermined themes. The journal is available online free of charge. Printed issues can be later subscribed from Unigrafi’s print-on-demand service.

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SUPPORTING TEACHERS
LIFE-LONG LEARNING

PRE-SERVICE TEACHER TRAINING

IN-SERVICE TEACHER TRAINING

INTEGRATING FORMAL, NON-FORMAL AND INFORMAL LEARNING
Teacher education & LUMA at the University of Helsinki

University of Helsinki

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<th>Faculty of Behavioural Sciences</th>
<th>Faculty of Arts</th>
<th>Faculty of Science</th>
<th>Faculty of Biosciences</th>
<th>Faculty of Theology</th>
<th>Faculty of Social Sciences</th>
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<td>Dept. of Teacher Education</td>
<td>Teacher Training Schools</td>
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Secondary teacher education:

- **pedagogical studies** + **subject studies**

Primary teacher education

ALL TEACHERS HAVE A MASTER DEGREE
Summamutikka: MATH education centre

New directions:

• Clubs outside schools and university (e.g. in Public libraries)

• Virtual Clubs
  • Little Jippos
  • Mathversum (for secondary schools)

Experience and models:
Math Days
Math Clubs
Math Camps
Visits to University
Training for teachers
New teaching methods
-> For School and University
Computer Science Resource Centre, LINKKI

• Develop and disseminate educational models and materials on
  • Computing, communication and programming
  • Digital society citizenship
  • Production of safe computer and service systems

• Increase awareness of technology as enabler in
  • learning, participation, creativity
  • personal capability in modern society, with equality
  • business domain

Photo: Arto Wikla
• Founded v. 2008
• Collaboration between
  – University of Helsinki
  – Finnish chemistry industry
  – Pedagogical institutions
• Coordinated by Centre for chemistry education (Kemma)
• Over 24 000 visitors and 1300 groups
• All school levels – free of charge
• Based on finnish national curriculum

CHEMISTRY EDUCATION CENTRE: CHEMISTRYLAB GADOLIN

• Study visits
  – Laboratory activities
  – Molecular modeling
  – Scientist meetings
  – Department and campus tours
• Clubs (all school levels)
• Camps (all school levels)

• Birthday parties
• Science fairs
• In-service training
• Pre-service training
• Material development
• Material lending
• Webinars
• Academic research
SPECIAL COLLABORATIVE IN-SERVICE TRAINING PROGRAMS

International happenings: e.g. 6th ISSE 2016 in LAHTI

USING MOOCS AND WEBINARS

INNOVATIVE TEACHERS IS A KEY FOR SUCCESS.
FORMATIVE ASSESSMENT AS A WORKSHOP OF THE LUMA/ISSE DAYS

- There are over 100 workshops for teachers at all levels
- Free of cost
- See: http://www.luma.fi/news
- Warmly welcome!

- **Formative assessment** is a key for students’s engagement in math, science and technology
- A project is collaboration with schools and university.
What do youth find important in non-formal learning?

What are the long-term effects of non-formal learning?

What is the nature of scientific, societal and moral questions that gifted youth ask?

How do gifted youth think about climate change?

NATIONAL AND INTERNATIONAL ACTIVITIES FOR KIDS AND YOUNG PEOPLE

both virtual and physical environments

SCIENCE CLUBS AND CAMPS

E.G. 26 IN UNIVERSITY OF HELSINKI THIS SUMMER

E.g. Tolppanen, S., & Aksela, M. (2013). Important social and academic interactions in supporting gifted youth in non-formal education. **LUMAT, 1, 279-298.**
National webmagazine for all teachers

LUMA Sanomat
Luonnontieteiden, matematiikan, tietotekniikan ja teknologian opetuksen kansallinen verkkolehdi

Toukokuun avaus: Kuinka opettaa paremmin?
Kuukauden kohokohtia
Nuoret ympäri maailman uskovat luonnontieteiden ja teknologian mahdollisuuksiin
Uutta: LUMA-rahasto palitsee vuoden LUMA-toimijoita

NEWEST RESEARCH, HAPPENINGS, MATERIALS

LUMA-TV: LUMA-webinars

Etusivu
Hae juttuja, tapahtumia, ...
Hakusanat tähän Etsi
Jutut
Tapahtumakalenteri
Opettajien täydennyskoulutukset
Lasten ja nuorten kerhot, klubit, leirit ym.
Materiaalit
Videot

Iloa LUMAsta kesälläkin
Julkaistu 20.06.2013
Lue lisää

Luonnontieteistä kisattiin Linnakallion kauniissa maalaismiljöössä
Julkaistu 19.06.2013
Alavieskassa Linnakallion maastossa järkki kulki, vides- ja kuudesluokkalaiset kävivät jännittävän matemaattisen luonnontieteellisen MALU-kisan loppukilpailun toukokuussa. Esikarsimmat järjestettiin maaliskuussa.

WWW.LUMA.FI

29.7.-9.8.2013 Toiminnallinen keskustelu lukiokäsitteistä matematiikan perusteista ja soveluksista, Tampere
20.9.2013 alkaen Eriytyminen LUMA-aineiden opetuksessa -täydennyskoulutus, Helsinki

Nyt ajankohtaista
30.9. mennessä käsikirjoitukset LUMAT-lehden julkukun numeroon

Tweets

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Mukavaa kesää ja Juhannusta!

Nov, 2013
VIRTUAL LEARNING ENVIRONMENTS FOR KIDS, PARENTS AND YOUNG PEOPLE
ESERA2015: Collaboration is key
Published 07.09.2015

The 11th Conference of the European Science Education Research Association (ESERA) brought STEM education experts from all over the world to the Finnish capital, Helsinki, last week.
THE NEWEST THING OF THE LUMA ACTIONS: START

- FINLAND IS CELEBRATING ITS’ 100TH ANNIVERSARY IN 2017
- START IS AN OFFICIAL PROGRAM TO CELEBRATE IT
- PROJECT-BASED LEARNING
- YOU ARE WARMLY WELCOME TO PARTICIPATE IT
- SEE DETAILS: HTTP://WWW.LUMA.FI/START
REFERENCES

Inspiration, Joy, and Support of STEM for Children, Youth, and Teachers through the Innovative LUMA Collaboration


http://www.luma.fi/news
THE NEXT STEPS FOR OUR COLLABORATION

- A OFFICIAL CONTRACT PAPER FOR COLLABORATION PROGRAM?
- HOW TO DO IT?
- TIMETABLE? 3 YEARS? 5 YEARS?

THE LUMA MOTTO: TOGETHER WE ARE MORE!
THANK YOU FOR YOUR ATTENTION!

COLLABORATION WITH CHINA

TOGETHER WE ARE MORE!
http://luma.fi/centre/