The ScienceMath – Professional Development Concept For Interdisciplinary Mathematical Lessons

Framework
for a Teacher Training Concept

Structure

Basis element: E1

Short, middle and variable versions: Consists of E1 (see description below) according to the interests of the participants, perhaps in combination of other elements

Long term version: Consists of the five Elements E1, E2, E3, E4, E5.

Long term version (with less university presence): Consists of the three Elements E1, E4, E5

E1: Presentations and workshops at the University – learning the content and material (ScienceMath-Modules, see detailed description below)

E2: Intervening period – preparing the material for school

E3: Workshop at the University – Discussing the preparation

E4: Intervening period – implementation in the classroom

E5: Seminar at the University – Exchange and improvement discussion

Material

ScienceMath-modules: www.sciencemath.ph-gmuend.de (see also last page)
Introducing power-point-presentation: see Website: teacher-training > "ScienceMath Presentation"
Module Overview: see Website: teacher training > "Module list"

Literature

Michelsen, C. (2008). Preparing the teachers for an interdisciplinary curriculum: Modelling courses for secondary in-service teachers.
Print version in: Beiträge zum Mathematikunterricht Budapest 2008 (Franzbecker Verlag), Power-point-version: see ScienceMath-Website > teacher training

Further literature at the ScienceMath-Website

Basis Element E 1

The basis element is the starting activity for a long term version, the core of a teacher training event or the central part of it at the university resp. organising institution. It can be also offered as one single event (like e.g. in Ljubljana 2009).
Contents, length and intensity can be chosen according to the interests of the participants.

Different possible versions of E1:

Introduction, Presentation/ workshop at the University

Version 1:
Content: background presentation and one or more ScienceMath modules
Duration and kind of activities: afternoon, interactive presentation, discussion, group work, brain storming

Version 2:
Content: background presentation and one or more ScienceMath modules
Duration and kind of presentation: half or full day, interactive presentation, discussion, group work/ workshop with material, brain storming

Version 3:
Content: background presentation and different ScienceMath modules (individual chose)
Duration and kind of presentation: one or two days, interactive presentation, discussion, group work/ workshop with material, brain storming

Version 4: European teacher event
Content: background presentation and different ScienceMath modules (individual chose),
Duration and kind of presentation: one week, interactive presentation, discussion, group work/ workshop with material, brain storming

Examples: see next pages

Example for a two day event of version 3:

Day 1

- Welcome – registration and reception ½ h
- Presentation *ScienceMath*
  See Annex 1: prepared power-point 1 h
- Introduction into the theme groups ¼ h
  See Annex 2: modules are according to the special offer
- Break: Participants chose groups of special interest ¾ h
- First group meeting: Introduction into the theme ½ h
  according to the choice of the presenter
  First activities, chosing cooperation partners 1 h

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4 h

Day 2

- Welcome - informal exchange ½ h
- Working in the groups
  Getting familiar with the content and material of the module/s 2 h
- Discussion in the group ½ h
- Break – lunch 1 ½ h
- Working in the group: Preparing own working sheets 3 h
- Working in the group: Arranging all needed equipment for teaching the module in school resp. writing a ToDo-list and planning the concrete school project; e.g. prepare a table with room for further remarks 1 h

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8 ½ h

Example (positive evaluated ScienceMath PD-event of Ljubljana 2009) of version 4:

Note: The following programme is a proposal and covering the already practiced event. The offer includes presentations of background ideas, modules, research results and workshops with material. The selection of the modules can change according to the target group and their interests.

Programme

Sunday

Arrival of the Participants for Teacher´s Professional Development

Monday

Time	Approx.	Session	Theme
8-12	15 min	Presentation	Welcome, Introduction
	45 min	Presentation	ScienceMath project presentation: Aims and Results
	30 min	Discussion	Participants introduce themselves
	15 min	Coffee	
	120 min	Presentation	Calculus; from physics …
12-14	Lunch		
14-17	180 min	Workshop	… towards mathematics
17-	Visit downtown		

Tuesday

Time	Approx.	Session	Theme
8-12	30 min	Presentation	Functions and Sounds
	60 min	Workshop	Functional relations Part 1: Introduction and trying the material - a
	15 min	Coffee	
	120 min		Functional relations Part 1: Introduction and trying the material - b
12-14	Lunch		
14-17	60 min	Workshop	Nutrition Circle, Proportions: Similarity and Allometry
	15 min	Coffee	
	90 min	Workshop	Creating interdisciplinary lessons between math and science; Part 1
17-	Free		

Wednesday

Time	Approx.	Session	Theme
8-12	60 min	Presentation	Experiments and concept of variable
	90 min	Workshop	Functional relations Part 2: Creating own worksheets
	15 min	Coffee	
	60 min	Workshop	Creating interdisciplinary lessons between math and science; Part 2
12-14	Lunch		
14-20 (or 13 - 20)	360 min	Excursion (Workshop)	Measurements in real world – field work incorporated into science teaching excursion

Thursday

Time	Approx.	Session	Theme
8-12	30 min	Presentation	Concept of parallelism and concept of gravity
	45 min	Presentation	Fermat meets Pythagoras and Fermat´s Principle
	30 min	Presentation	Parabola and Technology
	15 min	Coffee	
	30 min	Presentation	Students' discussions about mathematics and society: Modelling population growth.
	60 min	Workshop	Functional relations Part 3: Discussing the module
12-14	Lunch		
14-17	90 min	Workshop	Arithmetic mean and car differential
	15 min	Coffee	
	60 min	Presentation	Logarithms
17-	Typical dinner		

Friday 28th August

Time	Approx.	Session	Theme
8-12	30 min	Presentation	Modelling motion: the case of shooting in water
	60 min	Presentation	From coupled pendulum toward Fourier analyses
	15 min	Coffee	
	90 min	Discussion	Final discussion
	30 min	Conclusion and farewell	

E 2
Intervening Period: Preparing the materials for school

- The chosen modules are prepared for school: Preparing/ buying the needed equipment, copy of worksheets etc.
- Thinking about a concept of implementation: room, class, cooperation partner etc.
- Documentation of experiences and critics

About: 1 month time

E3
Workshop at the University

Day 1

▪ Welcome – registration	½ h
▪ Working in the theme groups: Exchanging and discussion experiences and material, If needed: preparing and improving the material for implementation	2 ½ h
▪ Common lunch	1 ½ h
	4 ½ h

E 4
Intervening Period: Preparing the modules and Teching them at school

- The chosen modules are prepared for school: Preparing/ buying the needed equipment, copy of worksheets etc.
- Thinking about a concept of implementation: room, class, cooperation partner etc.
- Doing the necessary steps for realisation
- Teaching and implementation at school
- Documentation of experiences and critics

About: 8 weeks

E 5
Seminar at the University

Day 1

- Welcome – registration and reception ½ h
- Working in the theme groups:
  Presentation of the results/Experiences and discussion 2 h
- Break: lunch 1 h
- Working in the group: Discussion , resp. improving the material 1 ½ h
- Break: coffee and cake ½ h
- Exchanging the material between all participants 1 h
- Plenary: Short Presentation of the modules ideas, concerning important aspects for a successful teaching 1 ½ h
- Informal close – time for more exchange and further plannings (open) 1 h

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9 h with open end

Continuing the same way with other modules.
Individual changes are of course possible.