

INTERNATIONAL
SOCIETY FOR
DESIGN AND
DEVELOPMENT IN
EDUCATION

ISDDE

Annual Conference 2010

Designing and experiencing products and processes

Mon 27th - Thur 30th September 2010

Balliol College, University of Oxford, England

Programme



Centre for Research in Mathematics Education (Shell Centre)

University of Nottingham

Conference Chair: Malcolm Swan

ISDDE Conference 2010
Designing and Experiencing products and processes
Mon 27th-Thur 30th September 2010,
Balliol College, Oxford

The particular theme of this conference is on the ways in which people *experience and use* products and processes designed by others, and the ways in which designers can anticipate and learn from these experiences and put them to use in building and refining designs.

Designs may be intended for policymakers, examiners, teachers or students – the foci of the working groups in which much of the work of the conference will be done. As in previous conferences, each day begins with a plenary lecture and ends with a design demonstration. A distinctive feature this time will be “Experience” sessions where participants in each working group will be led to experience a design as “users”, going on to reflect on the implications for design of that experience. We hope that the conference will thus both be informative *and* experiential.

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Session Locations

Plenary Sessions will all be held in Lecture Room XXIII (23)

Working group 1 will be held in Lecture Room XXIII

Working group 2 will be held in the Russell Room

Working group 3 will be held in the Massey Room

Experience Session rooms will be allocated on the first day, according to numbers signing up:

- Lecture Room XXIII
- Russell Room
- Massey Room
- Bajpai Room

Program Outline

Monday 27th September

1900 Informal buffet, Balliol Hall

Tuesday 28th September

0900 Welcome and introductions: Malcolm Swan, Conference Chair
Plenary: John Mason and Anne Watson
Designing and experiencing tasks for mathematical thinking and reasoning

1015 coffee

1035 Experiencing a design

1145 Working groups: *Introductions and Issue A*

1230 lunch

1330 Working groups: *Issues B and C*

1530 tea

1600 Design demonstrations

1700 break

1900 Conference Dinner, Ashmolean Museum

Wednesday 29th September

0900 Plenary: Robin Millar Chair: Angela Hall
Designing and experiencing a science curriculum

1000 coffee

1020 Experiencing a design

1130 Working groups: *Issue D*

1230 lunch

1330 Working groups: *Issue E and drafting subgroup reports*

1530 tea

1600 Design demonstrations

1700 break

18.30 Dinner, Balliol Hall

Thursday 30th September

0900 Plenary: Phil Daro Chair: Hugh Burkhardt
Designing and experiencing educational policy

1000 coffee

1030 Working groups: *Finalising reports*

1230 lunch

1330 Plenary: *Reports from the working groups with discussion*

1430 Chair of ISDDE: Hugh Burkhardt
What next for ISDDE?

1530 conference closes with tea

Evening Informal dining around Oxford

Plenary Sessions

Tuesday 28th September: 9:00

Designing and experiencing tasks for mathematical thinking and reasoning

John Mason and Anne Watson



Anne Watson - University of Oxford, UK

I am Professor of Mathematics Education at Oxford University, having come here as Lecturer in Educational Studies (Mathematics) and a Fellow of Linacre College in 1996. My first degree and MSc are in Pure Mathematics, my DPhil and subsequent research are in Mathematics Education. I am currently on the Advisory Committee on Mathematics Education. Before I came to Oxford I had taught mathematics for several years in two comprehensive schools, Stantonbury Campus, Milton Keynes, where I was eventually Head of Year, and Peers School, Oxford, where I was Head of Mathematics.



John Mason - University of Oxford and the Open University, UK

I have taught at least one person mathematics every year since I was 15. I work experientially, providing tasks through which it may be possible to share experience and so learn from that experience. I was at the Open University for over 39 years, and contributed to most of the publications and course materials produced by the Centre for Mathematics Education.

Wednesday 29th September 9:00

Designing and experiencing a science curriculum

Robin Millar - University of York, UK



Robin Millar is Salters' Professor of Science Education at the University of York. He graduated in Natural Sciences (Part II in Theoretical Physics) from Cambridge, and did a PhD in medical physics at Edinburgh, before training as a teacher. He taught physics and integrated science for 8 years in secondary schools in Scotland before moving to York in 1982. He teaches on the undergraduate and masters programmes in education and the Science PGCE, and supervises doctoral studies in science education. His main research interests are in teaching and learning science (especially physics) at secondary school level, and curriculum design and development with a particular focus on the development of scientific literacy. He has directed several large research projects, most recently the Evidence-Based Practice in Science Education network. He was an author of the influential report Beyond 2000, and played a leading role in major curriculum development projects, including Salters' GCSE Science, AS Science for Public Understanding and Twenty First Century Science.

Thursday 30th September 9:00

Designing and experiencing educational policy:

Phil Daro - University of California, Berkeley, USA



Phil Daro works on advancing the design and use of leadership tools for change at every level of the educational system. Currently, he is leading the design of the Common Core State Standards for Mathematics, commissioned at President Obama's suggestion by the US National Governors Association and Council for Chief State School Officers. Conscious of the negative effects of "standards" based on detailed lists of mathematical content, his team are treating their task as an innovative design challenge. They are seeking to emphasize mathematical practices and to reduce ambiguity through exemplification with mathematical tasks.

Earlier, Phil directed Research and Development for the National Center for Education and the Economy (NCEE) and the New Standards Project. He directed the development of a middle school mathematics program inspired by the Japanese curriculum. He directed large scale teacher professional development programs for the University of California, including the California Mathematics Project and the American Mathematics Project, and projects to help states develop standards, accountability and testing systems. He has advised school systems across the US and served on many national committees, including the NAEP Validity Committee, various ACHIEVE groups in mathematics and assessment, and the Mathematical Sciences Education Board of the National Research Council. He is Vice-Chair of ISDDE.

Experience Sessions

Four parallel experience sessions are planned on each day, with design foci on: *Classrooms; Teacher development; Examinations; Policy-making*. These are 'hands-on', participation sessions. A designer first presents a task for the group to work on. There will be a classroom or assessment task to do, a framework to implement, or a teacher development activity to engage in. This will be followed by a discussion of the varied experiences of the participants and these will be compared with the designer's original intentions and principles. By studying specific designs in depth, we aim to ground the working group discussions and begin to draw out more general issues.

Tuesday 28th September 10:35-11:45

Theme: Classrooms

Experiencing Algebra textbooks

Anne Watson

Algebra exercises have a reputation of being boring, repetitive and pointless. We are going to work through (fun!) and analyse some secondary school algebra exercises from the point of view of task design and use them to re-contact fundamental ideas about learning.

Theme: Teacher Development

Experiencing professional development in science

Jean Scrase and Angela Hall

With the explicit inclusion of processes of the discipline into science and mathematics curricula, the integration of processes and more traditional content is an ongoing challenge. Educators need to develop an evidence-based pedagogy which can inform educational design and teacher professional development. The Learning Skills for Science (LSS) project has built on work by the Weizmann Institute, Israel, to address the integration of Learning Skills into the secondary science curriculum in the UK. This session will provide an opportunity for participants to try out some LSS resources, and discuss the general issues raised.

Theme: Designer & researcher development

Experiencing the development of a design research project in Science

Marijn Meijer

Based on our study 'Design-Based Research in Science Education: the case of macro-micro thinking' a DBR method will be shortly presented and fully explored and discussed by the participants of the session. This DBR method involves research activities, focussing on design principles as design tools, a design framework for a teaching-learning process and instructional functions and the knowledge claim of DBR.

Theme: Examinations & Policy-making

Experiencing policy in curriculum design in Mathematics

Betty Phillips

The *Connected Mathematics* curriculum (CMP) which was funded by NSF and has undergone two five-year cycles of design, field-testing, and evaluation has produced several geometry/measurement units over grades 6, 7 and 8 that are widely used and received in the United States. In this session we will discuss the issues of incorporating the new USA's Common Core State Standards (CCSS) for geometry and measurement into these well-engineered units. Some of the issues involve depth of understanding, coherence, and grade level coherence.

Wednesday (10:20-11:30)

Theme: Classrooms and teacher development

Experiencing tasks from "Curious minds"

Willem Uittenbogaard

Curious Minds is a project in which young children (3-5 years) can improve their skills in the field of mathematics and science. We started in the beginning of 2006, interviewing and taping young children and have now taped about 250. Two years ago we started to follow 20 children from 3,5 till they are 20 years old. The oldest children in the group are now 6 years old (a kind of 7-UP). We made several inservice materials. I will present one about using gravity. Each participant will receive a booklet (in Dutch, with a part translated into English) with photographs and a disc with videos for every participant.

Theme: Teacher Development

Experiencing professional development for modeling

Geoff Wake

This session will allow participants to experience a session in which they can explore issues relating to using formative assessment in modeling lessons and giving feedback to students. The activities are based on materials from the EU funded LEMA project (www.lemma-project.org <<http://www.lemma-project.org>>) and which tackle assessment by primarily considering formative assessment approaches that can lead to summative assessment. The session will involve role play and discussion.

Theme: Designer development

Experiencing a course for designers in Indonesia

Frans von Galen

In cooperation with two Indonesian universities, the Freudenthal Institute organises a master study 'Research and Development in Mathematics Education'. In the session I would like to discuss the course on 'Educational Design'. We shall concentrate on the final task for the students, which was to design a lesson on area for grade 6. I hope that by analysing the designs of the master students, we can experience what makes designing for mathematics education so difficult. As a general conclusion I can say that all students have come up with activities that are interesting and engaging for the children, but they fail to make clear how a teacher could use the activity to have an overarching discussion on the concept of area.

Theme: Examinations & Policy-making

Experiencing policy in assessment design

Hugh Burkhardt

After a short introduction, participants will be given:

- a traditional examination paper
- the Common Core State Standards - Mathematical Practices

They will work as designers, in groups of two or three, to begin to sketch new tasks to add in order to better assess these new standards and outline what a balanced examination should now look like.

Working group sessions

Three parallel working groups are planned.

These are entitled:

- **Classroom Materials Working Group**
Co-chairs: Betty Phillips and Angela Hall
- **Professional Development Working Group**
Co-chairs: Malcolm Swan, Geoff Wake, Susan McKenney
- **Policy and Examinations Working Group**
Co-chairs: Phil Daro and Hugh Burkhardt

The purpose of each working group will be to discuss and assemble a presentation on:

- *How do we design and how do we evaluate our designs?*
- **How** *can we learn from the experience of end-users?*
- **What** *have we learned from the experience of end-users?*
- *How can we improve our learning processes?*

In the working group sessions the emphasis will be on sharing of knowledge and experience, and on reflective discussion, not on formal presentations. Participants are encouraged to bring examples of designs for others to discuss.

At the **Final plenary session** of the conference, the co-chairs will present a summary of the issues and main points from each Working Group.

The final text of the work of these groups will be revised after the conference, by October 31st. We hope that the work of these groups will contribute to articles in *Educational Designer*, the journal of ISDDE.

Detailed programmes for each Working group are given on the following pages.

Working Group 1: Classroom Materials

Co-chairs: Betty Phillips and Angela Hall

This group will work on the design of classroom resources. The discussions will be structured around five key issues. The final nature of these will be discussed in the first session and may be modified to accord more closely with the interests of participants, but they are planned as follows:

- A. What values and principles underpin our design of classroom materials?
- B. How do we design materials to meet standards?
- C. How do we develop pedagogical content knowledge through classroom materials?
- D. How can we develop dialogic interaction through classroom materials?
- E. What are the implications of ICT for the design of classroom materials?

Each of these will be discussed in plenary sessions of the working group, then developed further and written up by a small subgroup for later review by the whole group.

The write-ups will consider the following questions. (These are similar across all working groups)

- *How do we design classroom materials, and how do we evaluate them?*
- *How can we learn from the experiences of end-users?*
How can we gather evidence of the impact of our designs?
- *What have we learned from the experiences of end-users?*
Stories of particular successes and failures.
- *How can we improve our learning process?*
Suggesting how we might accumulate professional knowledge on the design of classroom materials.

Tues 28th 11.45-12.30 Session 1

After brief introductions of group members, the co-chairs will introduce the program for the working group. The suggested issues will be discussed and five agreed.

Issue A: Are there common values and principles which underpin our design of classroom materials?

Discussion leader: *Angela Hall*

Building on the issues that arose at the previous ISDDE in Cairns, we will discuss whether it is possible and desirable to develop a common framework for values and principles that underpin the design of classroom materials. Participants will be invited to provide examples of design values and principles from their own countries.

Tues 28th 13.30-15.30 Session 2

Issue B: How do we design materials to meet Standards?

Discussion leader: *Betty Phillips*

The United States has just embarked on its first set of National Standards that 48 states have agreed to implement. The grade level standards and assessment and the short time allowed to implement the standards places great demands on curriculum writers to develop, field test, and evaluate a curriculum that meets these demands. Grade level standards also limit the nature and possibility of alternate developmental and learning sequences. In this session we will discuss the design issues that arise as materials designers are required to meet given "Standards".

Issue C: *How do we develop pedagogical content knowledge through classroom materials?*

Discussion leader: *Mary Bouck*

Classroom materials usually assume particular pedagogical approaches. In some cases they remain implicit, but increasingly, designers make them explicit through teachers' guides and lesson plans. In this session we will discuss the different ways we communicate effective teaching approaches within materials, how these are experienced by teachers and learners and how we might improve our design practices.

Wed 29th 11.30-12.30 Session 3

Issue D: *How can we develop dialogic interaction through classroom materials?*

Discussion leader: *Nichola Clarke*

The quality of the learning in classrooms depends on several factors. *Preparatory factors* are clarity about the learning aims, and the design or selection of tasks that have the potential to engage students in an interactive dialogue to work to those aims. The key *Implementation factors* are the teacher's presentation of the task, and that teacher's capacity to encourage, interact with, and use the students' responses so that as many as possible are engaged. It is in the implementation that formative assessment occurs, and a decision about any formative feedback must be contingent on the responses, often un-predictable, of the students. So the question is - how can educational materials be designed both to enrich students' engagement and to prepare teachers to deal with the un-predictable?

Wed 29th 13.30-15.30 Session 4

Issue E: *What are the implications of ICT for the design of classroom materials?*

Discussion leader: *Peter Boon*

Experiencing the design of digital lesson materials and their integration in longer learning trajectories.

Subgroups will develop and write up the discussion of their issue during the second half of this session.

Thur 30th 10.30-12.30 Session 5

The subgroup leaders will each present their draft reports to the working group for discussion, with Secretaries noting suggested additions and revisions.

At the **Final plenary session** of the conference, the co-chairs will present a summary of the issues and main points from the subgroups. (1 ppt page per subgroup)

Working Group 2: Professional Development

Co-chairs: Malcolm Swan, Geoff Wake, Susan McKenney

This working group will discuss the design of professional development for teachers and designers. The discussions will be structured around five key issues. The final nature of these will be discussed in the first session and may be modified to accord more closely with the interests of participants, but they are planned as follows:

- A. What values and assumptions underly our professional development designs?
- B. How do we design professional development for the teaching of mathematical and scientific processes?
- C. How can we make effective use of multimedia in professional development?
- D. How do we design professional development for designers?
- E. How do we evaluate professional development designs?

The sessions of the working group will be a combination of short presentations, discussions, activities and writing. Each issue will first be discussed in a plenary session, then developed further and written up by a subgroup.

The discussion leader of each session and a secretary will be responsible for coordinating the writing of the subgroup report. The write-ups will consider the following questions. (These are similar across all working groups)

- *How do we design professional development programs, activities and how do we evaluate them?*
Which principles underpin our designs? How do we select and organize activities, tasks?
- *How do we learn from the experiences of end-users?*
How do we gather evidence of the impact of our designs?
What variations do we observe in the ways our designs are used?
- *What have we learned from the experiences of users?*
Stories of particular successes and failures.
- *How can we improve our learning process?*
Suggesting how we might accumulate professional knowledge on the design of PD.

Tues 28th 11.45-12.30 Session 1

After brief introductions of each member, the chair(s) will introduce the program for the working group. The suggested issues will be discussed and five finalized.

Issue A: What values and assumptions underly our professional development designs?

Discussion leader: *Malcolm Swan*

Underlying all professional development courses and events are sets of values and principles. For example, they may be designed to foster subject knowledge, general pedagogical knowledge or pedagogical content knowledge. How are these values reflected in the designs of such courses? Participants are encouraged to share specific examples of tasks or activities that they use in PD courses and describe how they embody different values and principles. It is hoped that in this session, we will also share what we have learned at previous ISDDE conferences and build on this experience.

Tues 28th 13.30-15.30 Session 2

Issue B: *How do we design professional development for the teaching of mathematical and scientific processes?*

Discussion leader: *Jean Scrase*

Teaching so as to encourage mathematical and scientific processes requires a radical shift in the beliefs and practices of teachers more used to transmission modes of teaching. In this session we will share some of the PD designs that are intended to facilitate this shift.

Issue C: *How can we make effective use of multimedia in professional development?*

Discussion leader: *Geoff Wake*

Subgroup Secretary: *by invitation from those who sign up*

Stand-alone, distance learning PD resources are potentially more cost-effective than face-to-face PD. The use of multimedia (videos, interactive software) can offer vivid, powerful experiences. The design of these, however, raises many challenges. How may teachers be supported at a distance by such resources?

Wed 29th 11.30-12.30 Session 3

Issue D: *How do we design professional development for designers?*

Discussion leader: *Susan McKenny, Frans von Galen, Jacquy Barber*

In this session, we will present case studies of the education of new designers using three perspectives: Master-apprentice; content focus in the foreground with educational design in the background; educational design in the foreground with content in the background.

Wed 29th 13.30-15.30 Session 4

Issue E: *How do we evaluate professional development designs?*

Discussion leader: *Alan Schoenfeld*

How do we evaluate the effectiveness of our PD designs? What evidence do we gather about changes in teachers' behaviours, beliefs, and values? In this session we will share some of the methods and tools we use to gather this data and the ways in which data may be used to refine and improve our designs.

Subgroups will develop and write up the discussion of their issue during the second half of this session.

Thur 30th 10.30-12.30 Session 5: Discussion of drafts

The subgroup leaders will each present their draft reports to the working group for discussion, with Secretaries noting suggested additions and revisions (text to be revised after the conference, by October 31st, building on a 1 PowerPoint page summary, see below)

At the **Final plenary session** of the conference, the co-chairs will present a summary of the issues and main points from the subgroups (1 ppt page per subgroup)

Working Group 3: Policy and Examinations

Co-chairs: Phil Daro and Hugh Burkhardt

This group will work on the roles and structures of high-stakes assessment (here called examinations) and their relation to policy frameworks of various kinds. The discussions will be structured around five key issues. The final nature of these will be discussed in the first session and may be modified to accord more closely with the interests of participants, but they are planned as follows:

- A. Examinations have many purposes. How can we design them to fit?
- B. What are the effects of examination design on policy implementation?
- C. How can we design examinations to support changes in policy?
- D. Computer-based assessment: What can it do for school mathematics?
- E. How can we work with policy makers to make better use of examinations?

Each of these will be discussed in plenary sessions of the working group, then developed further and written up by a small subgroup for later review by the whole group. The write-ups will consider the following questions. (These are similar across all working groups)

- *How do we design examinations and policies, and how do we evaluate them?*
- *How can we better learn from the experiences of end-users?*
How can we gather evidence of the impact of our designs?
- *What have we learned from the experiences of end-users?*
Stories of particular successes and failures.
- *How can we improve our learning process?*
Suggesting how we might accumulate professional knowledge on the design of examinations and policy.

Tues 28th 11.45-12.30 Session 1

After brief introductions of group members, the co-chairs will introduce the program for the working group. The suggested issues will be discussed and five agreed.

Issue A: Examinations have many purposes - How can we design them to fit?

Discussion leader: *Phil Daro*

Examinations are used for extremely consequential purposes for which they have not been designed. This mismatch between actual use and design objectives leads to invalid inferences of great consequence. This session will consider the question:

- What if we designed for actual uses and interpretations? What would the examinations be like?

and, more specifically, some actual uses not designed for, including:

- How can we design examinations to “steer” the system in the right ways?
- How can we design to detect growth, particularly in students of special concern?
- What kinds of scaffolding enable teachers to improve feedback to students?

Tues 28th 13.30-15.30 Session 2

Issue B: What are the effects of examination design on policy implementation?

Discussion leader: *Max Stephens*

What You Test Is What You Get – how far is WYTIWYG true? How does it depend on the school system involved? What is the evidence, and how could it be improved? How far can its negative effects be minimized? Insofar as it is true, how can it be used to support rather than inhibit progress? Discussion will consider the following questions:

- Where in “testing that matters” can we see attempts to have what is assessed better reflect and support the full range of goals of school mathematics? End-of-school assessments are one place to look but other forms of assessment and systemic monitoring are also relevant.
- How should we respond to the suite of arguments that are typically used to resist change: the impracticability of an expanded range of assessment tasks, their demand on teachers’ time, demands on students’ time, the need to ensure integrity and credibility of the assessment system, issues such as comparability, and so on.
- Can we point to any reforms that have overcome these lines of resistance and have shown that the arguments opposing reform are largely without substance?

Issue C: How can we design examinations to support changes in policy?

Discussion leader: *Hugh Burkhardt*,

Examinations are widely regarded as simply a “measurement” of student achievement (ignoring other effects, as in Issue B). Often, much more attention is paid to the statistical properties of the results and the “fairness” of the examining process than to the aspects of performance in the subject that are actually assessed, their range and balance. This raises challenges for designers, including:

- What design principles would lead to examinations that reflect policy goals in a more balanced way?
- What are the cost implications?
- How far is the human capital with the necessary design skills available?

Wed 29th 11.30-12.30 Session 3

Issue D: Computer-based assessment: What can it do for school mathematics?

Discussion leader: *Daniel Pead*

There is great enthusiasm in various places for computer-based assessment - not always shared by students who have experienced computer-based tests of mathematics. This session will outline some strengths and weaknesses of computer-based assessment, leading to the following questions with implications for design:

- How might the use and perception of IT vary between subjects? What medium would you choose for your initial exploration of a mathematics problem, or a science problem?
- Does the current state of computer-based assessment help or hinder the aims of "assessment reform" – for example, the need to assess "process skills"/"mathematical practices"/"inquiry"
- How might computers help in formative assessment?
- Can computer-based assessments incorporate the authentic use of computers as a mathematical tool? Would this help assessment reform?

- What would you put in an "essential software toolkit" that students would be expected to use during assessments? How, and to what extent do you think these are used in typical schools?
- Would the curriculum need to change to permit the use of such tools in assessment? What can be achieved without curriculum change?

Wed 29th 13.30-15.30 Session 4

Issue E: How can we work with policy makers to choose better examinations?

Discussion leader: *Glenda Lappan*

Subgroup Secretary: *by invitation from those who sign up*

Policy makers, having little expertise in science and mathematics education, are often hardly aware of the issues discussed so far. They accept the status quo as basically satisfactory. How can the design community work to improve this situation, so that policy makers are persuaded to commission the design of:

- policy statements that are less susceptible to misinterpretation
- examinations that support them.

Subgroups will develop and write up the discussion of their issue during the second half of this session.

Thur 30th 10.30-12.30 Session 5

The subgroup leaders will each present their draft reports to the working group for discussion, with Secretaries noting suggested additions and revisions (texts to be revised after the conference, by October 31st, building on a 1 ppt page summary, see below)

At the **Final plenary session** of the conference, the co-chairs will present a summary of the issues and main points from the subgroups (1 ppt page per subgroup)

Working group sessions with special emphasis on using technology

We recognise that a few participants have a special interest on the use of technology and would like to attend these sessions across working groups. To make this possible, these sessions have been timetabled separately, as follows:

Tues 28th 14.30-15.30 Working group 2: Session 2b

Issue C: *How can we make effective use of multimedia in professional development?*

Stand-alone, distance learning PD resources are potentially more cost-effective than face-to-face PD. The use of multimedia (videos, interactive software) can offer vivid, powerful experiences. The design of these, however, raises many challenges. How may teachers be supported at a distance by such resources?

Wed 29th 11.30-12.30 Working group 3: Session 3

Issue D: *Computer-based assessment: What can it do for school mathematics?*

There is great enthusiasm in various places for computer-based assessment - not always shared by students who have experienced computer-based tests of mathematics. This session will outline some strengths and weaknesses of computer-based assessment, leading to the following questions with implications for design:

- How might the use and perception of IT vary between subjects? What medium would you choose for your initial exploration of a mathematics problem, or a science problem?
- Does the current state of computer-based assessment help or hinder the aims of "assessment reform" – for example, the need to assess "process skills"/"mathematical practices"/"inquiry"?
- How might computers help in formative assessment?
- Can computer-based assessments incorporate the authentic use of computers as a mathematical tool? Would this help assessment reform?
- What would you put in an "essential software toolkit" that students would be expected to use during assessments? How, and to what extent do you think these are used in typical schools?

Wed 29th 13.30-14.30 Working group 1: Session 4a

Issue E: *What are the implications of ICT for the design of classroom materials?*

Experiencing the design of digital lesson materials and their integration in longer learning trajectories.

Design Demonstrations

These will be opportunities for participants to present a 'show and tell' of their current design work. A short period of questions will follow each demonstration.

Tues 28th 16:00- 17:00

Professional development resources for formative assessment:

Malcolm Swan and Daniel Pead

We have recently been designing distance learning professional development resources for Mathematics teachers in the UK and the US as part of Bowland Maths and the Mathematics Assessment Project. In this session we will present some of the designs and issues involved.

Promoting Inquiry-based learning in Mathematics and Science across Europe

Katja Maas

How can a widespread uptake of materials for inquiry-based learning can be achieved? There are a lot of materials for inquiry-based learning and yet in day-to-day teaching, inquiry-based learning is still rare. The European Project Primas aims at implementing inquiry-based learning on a large Scale. Primas is a big European project in which 14 Universities out of 12 countries take part. In this talk the design of a dissemination plan for the widespread uptake of inquiry-based learning will be explained. We will also outline which chances we see to learn from the implementation of the materials in relation to design.

Wednesday 29th 16:00- 17:00

Designing lessons on "Velocity" for Primary Education

Frans von Galen

At the ISSDE 2008 conference I discussed a project on the mathematics of change in primary education. In a follow up project with Koeno Gravemeijer and others, at the TU Eindhoven, we are concentrating on the concept of velocity. In the demo session I would like to discuss the rationale behind the design and show some of the results.

The NRICH website

Charlie Gilderdale

The NRICH website initially published problems targeted at highly achieving maths students. Recently we have tried to cater for a much wider range of students by creating "low threshold - high ceiling" tasks. This session will offer delegates the opportunity to work on one of these tasks, and to see how such activities allow all students to engage with key mathematical processes, regardless of their prior level of achievement.

Biographies

Jacqueline Barber – Lawrence Hall of Science, University of California, Berkeley, USA

Over the past 30 years, Jacqueline Barber has been involved in K-12 science and mathematics education, involved in promoting teaching and learning among children, teachers, families and parents. She currently serves as Associate Director of the Lawrence Hall of Science responsible for the Hall's Curriculum Center. Barber is the Founding Director of the *Great Explorations in Math and Science* (GEMS) Program. In the past 7 years, Barber has collaborated with P. David Pearson, Dean of the UCB Graduate School of Education, to launch a new curriculum research and development program, focused on the integration of science and literacy, entitled *Seeds of Science/Roots of Reading*. Barber holds a Bachelor's degree in biology from Hampshire College and received a Fulbright Scholarship to conduct research in neuroendocrinology at the University of Strasbourg, France (1979) before turning to science education.

Alan Bell – Shell Centre for Mathematical Education, University of Nottingham, UK

Alan Bell is a member of the Shell Centre for Mathematical Education and works on the US-based MARS project - the Mathematics Assessment Resource Service. His main research interests are the development of students' understanding of particular mathematical concepts, effective methods of teaching, students' awareness of their learning (metacognition), and the learning and teaching of algebra. He is also concerned with the development of frameworks for the broader assessment of mathematical skills, concepts and general strategies. His long term interest in the learning of general mathematical strategies connects with his current MARS work, which is particularly concerned with the development of frameworks for classifying tasks and constructing balanced packages of assessment material. His publications include two books on mathematics for college students, an innovative problem-based course for Grades 6-7 and about 80 papers in journals. He wrote the Review of Research on Mathematical Education for the UK Cockcroft committee whose report Mathematics Counts has been widely influential. He has lectured on these topics by invitation in many countries.

Paul Black – King's College London, UK

Paul Black worked as a physicist for twenty years before moving to a chair in science education. He has made many contributions, to curriculum development for science in the Nuffield Curriculum Projects at primary and secondary levels, as leader for the science surveys of the APU in the 1980s, and to research into learning and assessment. He was chair of the U.K. government's Task Group on Assessment and Testing in 1988 which formulated advice on the new national assessment system. He has served on three assessment advisory groups of the USA National Research Council, as Visiting Professor at Stanford University, and as a member of the Assessment Reform Group. He is Professor Emeritus of Education at King's College London, and his work on formative assessment with Dylan Wiliam and colleagues at King's has had widespread impact.

Peter Boon – Freudenthal Institute, Netherlands

Over the last decade I have designed numerous java applets – English versions of some of these can be found on the WisWeb website. The background to this work is discussed in my article "Designing Didactical Tools And Microworlds For Mathematics Education". A recent article on software design within educational design processes can be found in the May 2009 issue of Educational Designer. In the last few years I have been working on the integration of digital activities (applets) in longer learning trajectories that are embedded in a digital learning environment. In close cooperation with schools and teachers we have built the DME (Digital Math Environment). This is an internet based learning environment that is now used by more than 100 Dutch schools. Embedding the applets in the DME offers several new possibilities that improve the usability of applets in educational practices. For example, students' work is stored and can be made accessible for teachers. Also the activities can be arranged and customized by teachers. A recent development within the DME-project is the design of a (mathematical) authoring tool for making new digital activities for students without the need for programming. Applets can now be used (in a flexible way) as interactive components within learning trajectories. I think that the development and use of this kind of authoring facility is necessary in the design of rich and versatile digital curriculum materials.

Mary Bouck – Michigan State University, USA

Mary is a former mathematics teacher and school administrator, finishing her 30-year public school career as a superintendent. During this time she worked in rural as well as urban schools. As an experienced educator, she has developed curriculum materials for elementary and middle grades and was a member of the writing group for the National Council of Teachers of Mathematics' Principles and Standards for School Mathematics. She is an experienced professional development leader and a leader in promoting change in mathematics education. Her research interests include the development of teachers, teacher-leaders, and administrators as well as student learning, curriculum, and assessment.

Hugh Burkhardt – Shell Centre for Mathematical Education, University of Nottingham, UK

Hugh Burkhardt has been at the Shell Centre for Mathematical Education at the University of Nottingham since 1976, as Director until 1992. Since then he has led a series of collaborative projects with UC Berkeley, Michigan State and Harvard including *Balanced Assessment for the Mathematics Curriculum*, MARS (*Mathematics Assessment Resource Service*), and its development of a *Toolkit for Change Agents*.

He takes an 'engineering' view of educational research and development – that it is about using imaginative design and systematic development to make a complex system work better, with theory as a guide and empirical evidence the ultimate arbiter. Currently the Bowland Maths project is forwarding another core interest – making mathematics more functional for everyone through teaching real problem solving and mathematical modeling. This is also central to a new US project that is developing materials to support teachers embarking on formative assessment – another collaboration with Alan Schoenfeld at UC Berkeley, funded by the Gates Foundation. He led the foundation of the ISDDE, of which he is currently Executive Chair, and the development of its e-journal *Educational Designer*.

Nichola Clarke- Shell Centre for Mathematical Education, University of Nottingham, UK

Nichola joined the Shell Centre team in 2010 as a designer working on the Mathematics Assessment Program – a project to produce formative assessment lessons, summative tests and professional development for the USA, to complement the new Common Core State Standards. She has a background in Mathematics, Philosophy and mathematics teaching and is currently completing a DPhil at Linacre College, Oxford on the types of reasoning and the use of language by students with low prior attainment in mathematics.

Rita Crust - Shell Centre for Mathematical Education, University of Nottingham, UK

I am the lead designer in the Mathematics Assessment Resource Service, MARS, Shell Centre team with particular responsibility for assessment design. I am an experienced teacher, teacher educator, chief examiner and designer of curriculum and assessment. I lead the design of MARS US tests and classroom assessment tasks and co-ordinate the design work of MARS for several projects. For many years I have been a Principal Examiner in Mathematics for various UK examination boards. Since 1982 the MARS team has designed and developed assessment tasks and support materials specifically to stimulate systemic improvement, funded by Government agencies, large-scale assessment providers, foundation and school systems in the UK and the US (including NSF, CTB, Noyce Foundation, and various school systems) The MARS materials are developed and refined through an iterative process of testing in classrooms, using feedback to guide revision until they work well with the target groups of users. The initial trials are qualitative: for assessment tasks the later stages provide psychometric data and robust scoring schemes reinforced by specimen responses.

Christine Cunningham - Museum of Science, Boston, USA

I am the founder and director of the Engineering is Elementary: Engineering and Technology Lessons for Children (EiE) project. EiE is creating a research-based, standards-driven, and classroom-tested curriculum that integrates engineering and technology concepts and skills with elementary science topics. The EiE team is creating 20 units; each unit reinforces an elementary school science topic while focusing on a specific field of engineering. EiE lessons also connect with mathematics, language arts, and social studies. In addition to curriculum and resource development, the project also engages in professional development, and research and assessment. One of my areas of interest focuses on how to design materials that work for all children. I am especially interested in design that will invite and engage students who have traditionally been underrepresented in science and engineering, and underserved by the educational system. Such "at risk" populations include girls, minorities, people with disabilities, children on Individualized Education, Plans, English Language Learners, and children from low socioeconomic backgrounds. Understanding how to foster and scaffold all students' conceptual understanding, inquiry, and problem solving skills has been a central theme of our work. Another area of interest is the interplay between research and curriculum development, particularly when you are exploring a relatively new domain like elementary engineering about which little is known. How can we best structure research projects so they both inform and are informed by development and testing? What constraints and opportunities do such opportunities present?

Phil Daro – University of California, Berkeley, USA

Phil Daro currently directs the development of a middle school mathematics program inspired by the Japanese curriculum, works on advancing the design and use of leadership tools for change at every level of the educational system, and consults with states and school districts on their accountability systems and mathematics programs. He has served as Executive Director of The Public Forum on School Accountability, directed the New Standards Project (leader in standards and standards based test development) and Research and Development for the National Center for Education and the Economy (NCEE), responsibilities included test development, development of mathematics curriculum, and staff development programs, consulted to the New York City School District, the El Paso Collaborative, Los Angeles School District, Chicago Public Schools, Denver Public Schools, states of Vermont, Georgia, Kentucky, Rhode Island, and California and others. He directed large scale teacher professional development programs for the University of California including the California

Mathematics Project and the American Mathematics Project. His sixteen years at the University included six years directing projects to help states develop standards, accountability and testing systems. He has held leadership positions with the California Department of Education. Mr. Daro has served on a number of California and national Boards and committees including: NAEP Validity Committee; RAND Mathematics Education Research Panel; College Board Mathematics Framework Committee; ACHIEVE Technical (Assessment) Advisory Group, Mathematics Work Group; Technical Advisory Committee to National Goals Panel Working group: System Change Working group: Educational Software Working group: Curriculum & Assessment Working group: Classroom Materials Working group: Educational Software Mathematics Work Group; Technical Advisory Committee to National Goals Panel for World Class Standards, National Governors Association; Commission organized by Council of Chief State School Officers; Mathematical Sciences Education Board of the National Research Council; California Public Broadcasting Commission; and The Accrediting Commission for Senior Colleges and Universities (WASC). He has taught mathematics and is the father of three daughters. He is Vice-Chair of ISDDE.

Frank Davis – TERC, Cambridge, Mass. USA

I lead a non-profit research and development group that has as a mission improved mathematics and science learning for diverse communities of learners. This work assumes that system reform and change in both formal and informal learning and teaching environments.

Leslie Dietiker – Michigan State University, USA

Leslie Dietiker is a doctoral student in the Division of Science and Math Education at Michigan State University and has co-authored 6 different middle and high school math textbooks with CPM (College Preparatory Mathematics). Her primary interest is in improving written curriculum in ways that increases aesthetic appeal as well as student accessibility. Her dissertation explores the affordance of conceptualizing mathematics development of curriculum as a storyline, and will examine notions of character development and plot of written elementary textbooks.

Sheila Evans – Shell Centre for Mathematics Education, University of Nottingham, UK

Sheila joined the Shell Centre team in 2010 as a designer working on the Mathematics Assessment Program – a project to produce formative assessment lessons, summative tests and professional development for the USA, to complement the new Common Core State Standards. She is the author of *Access to Maths* – a book designed specifically for "Access courses" taken by students who wish to improve their mathematics before embarking on a degree.

Robert Floden – Michigan State University, USA

Robert Floden is University Distinguished Professor of Teacher Education, Measurement and Quantitative Methods, and Educational Psychology at Michigan State University. Floden received an AB with honors in philosophy from Princeton University and an MS in statistics and PhD in philosophy of education from Stanford University. He has studied teacher education and other influences on teaching and learning, including work on the cultures of teaching, on teacher development, on the character and effects of teacher education, and on how policy is linked to classroom practice. His current research includes studies of teacher preparation and work to develop tools for measuring several aspects of secondary school algebra instruction, including measures of teacher knowledge, classroom practice, and pupil understanding. Floden's work has been published in the *Handbook of Research on Teaching*, the *Handbook of Research on Teacher Education*, the *Handbook of Research on Mathematics Teaching and Learning*, and in many journals and books.

Alex Friedlander – Weizmann Institute of Science, Israel

Alex has worked for 35 years in design of activities, comprehensive curriculum projects and research on learning materials at the middle grades and elementary levels.

Frans van Galen – Freudenthal Institute, University of Utrecht, Netherlands

Frans van Galen is a researcher and developer of mathematics education at the Freudenthal Institute in the Netherlands. He has been involved in the development of different sorts of materials for Dutch primary schools and is co-author of Mathematics in Context, a math program for American middle schools. Many of the projects he has worked on concern the use of ICT in education. Amongst them is www.rekenweb.nl, a website with educational games and puzzles that already exists for more than ten years. He has been involved in several projects on in-service education and is one of the lecturers in a master program on mathematics education at the University of Utrecht that has recently started.

Charlie Gilderdale – University of Cambridge, UK

Charlie is a member of the University of Cambridge's Millennium Mathematics Project. He contributes to the NRICH website www.nr rich.maths.org and works in schools with students and teachers. His recent work has focussed on problem solving within the classroom and on creating opportunities for learning mathematics

through exploration and discussion.

Louis M. Gomez – University of Pittsburgh, USA

Louis M. Gomez is the Helen S. Fasion Chair in Urban Education at the University of Pittsburgh in the Learning Science and Policy Program within the School of Education. He is also senior scientist at the Learning Research and Development Center. Previously, he was Aon Professor of Learning Sciences and Professor of Computer Science at Northwestern University. Gomez's primary interest is in working with school communities to create social arrangements and curriculum that support school improvement. Along with his colleagues, he has been dedicated to collaborative research and development with urban schools to bring state-of-the-art instruction and support for community formation to traditionally underserved schools. Most recently, Gomez has worked with Anthony Bryk, President of the Carnegie Foundation for the Advancement of Teaching, to develop a new approach to education research and development, Design-Educational Engineering-and Development (DEED). They argue that isolated, short-term projects in a few sites must give way to longer-term, cooperative initiatives that move through repeated cycles of problem diagnosis, design, assessment, and redesign—a process carefully attuned to the variations among sites and circumstances in which improvements must take root. The DEED approach is based on the notion that it is not sufficient to know that a program or innovation *can* work. What is also important is to know *how to make it work reliably* over many diverse contexts and situations. Gomez received a BA in psychology from the State University of New York at Stony Brook and a PhD in cognitive psychology from the University of California at Berkeley.

Angela Hall – Nuffield Foundation, UK

Angela has been working at Nuffield since leaving teaching in 2000. She is codirector of the Salters-Nuffield Advanced Biology project (SNAB). Recent curriculum development experience includes the Twenty First Century Science project, the new A level Science in Society, Learning Skills for Science, a cross-curricular STEM resource for lower secondary and a resource for the Extended Project Qualification. For three years Angela was director of the Science Learning Centre, London, involved in professional development for science teachers and technicians. She returned to Nuffield as Director of the Foundation's Curriculum Programme in April 2007. Angela is studying for a PhD at the Institute of Education, University of London, looking at scaffolding learning through ICT tutorials. This work is based on her curriculum development work for SNAB, and has already informed the revisions of the resources.

Berit Haug – The Norwegian Centre for Science Education

I am a PhD-student at The Norwegian Centre for Science Education, University of Oslo. I am working at the project "Budding Science and Literacy" where we work in cooperation with elementary school teachers to design and develop a teaching model focusing on the synergy between inquiry based science and literacy.

Ian Jones – Centre for Research in Mathematics Education, University of Nottingham, UK

Ian Jones is a Royal Society Shuttleworth Education Research Fellow working on a five year project entitled "Reducing the mismatch between intentions and outcomes in GCSE mathematics". He joined the School of Education in 2009 and is a member of the Centre for Research in Mathematics Education. Ian is also an associate of the Learning Sciences Research Institute where he collaborates with members of the Mathematical Cognition Group on an Esmée Fairbairn Foundation funded research project entitled "How should the equals sign be taught

Vinay Kathotia – Nuffield Foundation, UK

Vinay is the head of the Mathematics Project at Nuffield where his role focuses on mathematics education across the Nuffield Foundation's research and development work. This includes mathematics at post-16, particularly courses which support mathematics requirements in other subjects. His previous position was at the Royal Institution.

Elizabeth Kimber – Nuffield Foundation, UK

Elizabeth studied mathematics at Oxford and St Andrews Universities and completed a Ph.D. in group theory in 2006. She teaches mathematics at Chetham's School of Music and has recently been seconded to the Nuffield Foundation as an Education Fellow.

Glenda Lappan – Michigan State University, USA

Glenda Lappan is a University Distinguished Professor in the Department of Mathematics and Division of Science and Mathematics Education, Michigan State University. She is currently the Director of the Connected Mathematics Project and Co-PI for the NSF-funded Center for the Study of Mathematic Curriculum. From 1989–91 she served as a Program Director at the National Science Foundation. From 1997–2001 she was President of the National Council of Teachers of Mathematics. She served as the Chair of the grades 5–8 writing group for the National Council of Teachers of Mathematics' (NCTM) *Curriculum and Evaluation Standards for School Mathematics* (1989), and as Chair of the Commission that developed the NCTM *Professional Standards for Teaching Mathematics* (1991). She served as President of NCTM during the development and release of the 2000 *NCTM Principles and Standards for School Mathematics*. She is past Chair of the Conference Board of the Mathematical Sciences and Vice Chair of the US National Commission on Mathematics Instruction. From 1997–1999 she served on the Advisory Board for Education and Human Resources at the National Science Foundation. From 1996 to 2003, she was appointed by the Secretary of Education to serve on the National Education Research Policy and Priorities Board for the Department of Education. Her research and development interests are in the connected areas of students' learning of mathematics and mathematics teacher professional growth and change at the middle and secondary levels. Glenda shared a 2008 ISDDE Prize with Elizabeth Phillips, for her work on *Connected Mathematics*.

Suzanna Loper – Lawrence Hall of Science, Berkeley, USA

Suzy Loper is a curriculum developer and researcher who leads the science curriculum team for *Seeds of Science/Roots of Reading*, a curriculum development and research project at the Lawrence Hall of Science. She is a former 6th grade science teacher and earned her Ph.D. in Education in Math, Science and Technology from the University of California, Berkeley.

Katja Mass – University of Freiburg, Germany

Professor Dr. **Katja Maass** is working as a researcher and teacher trainer at the department of mathematics at the University of Freiburg. Her main interests are in *modeling and applications* (solving open, realistic problems with the help of mathematics), promoting interdisciplinary approaches and IBL, and in the *professional development* of teachers. She is engaged in professional development courses about inquiry-based learning and contributes to professional development by several publications directly addressed to teachers. Recently, for example, the BMBF (German ministry of education and research) funded her to write and publish a magazine containing modeling tasks for children. She is also an acknowledged expert in mathematical modeling and was invited plenary speaker at the ICMI-Study about modeling 2003 and at the ICTMA (International Conference of Teaching Mathematics and its applications) 2005. She is the coordinator of EU projects promoting modeling in mathematics (LIMA) and inquiry-based learning in mathematics and science (PRIMAS).

John Mason – University of Oxford and the Open University, UK

I have taught at least one person mathematics every year since I was 15. I work experientially, providing tasks through which it may be possible to share experience and so learn from that experience. I was at the Open University for over 39 years, and contributed to most of the publications and course materials produced by the Centre for Mathematics Education.

Susan McKenney – University of Twente, Netherlands

I have a background in early childhood education, although I have also taught and conducted research in primary as well as junior secondary schools. In recent years, I have grown especially interested in exploring and supporting the interplay between curriculum development and teacher professional development. During the last 10 years, I have been engaged in a variety of design-based research endeavors that strive to maximize the natural synergy between these two processes. Much of my work on "learning by design" relates to designing teacher guides, learner material or other supportive curriculum documents.

Marijn Meijer – Freudenthal Institute, University of Utrecht, Netherlands

Marijn Meijer is currently a PhD student in Chemistry at the Freudenthal Institute. His research interests are in the Design of a context based unit about micro-macro thinking with structure-property relations.

Robin Millar – University of York, UK

I came to the Department of Educational Studies at York University in 1982, after 8 years teaching physics and general science in schools in the Edinburgh area. Before that I had graduated in Natural Sciences from Cambridge, done a PhD in Medical Physics at the University of Edinburgh, and trained as a science teacher at Moray House College. I have directed (or co-directed) several large science education projects, most recently as co-ordinator of the Evidence-based Practice in Science Education Research Network, which was part of the ESRC Teaching and Learning Research Programme. I have also been involved in several major curriculum development projects, including Salters Science, Salters Horners Advanced Physics, AS-level Science for Public Understanding and A-level Science in Society. I co-direct the Twenty First Century Science project, which has developed a suite

of GCSE courses with a scientific literacy core, designed to provide a more flexible set of options for schools and students.

Sonja Mork – Norwegian Centre for Science Education

Sonja M. Mork is an associate professor at the Norwegian Centre for Science Education. Her research is related to argumentation, basic skills and the use of ICT in science. She has also been developing Viten programs for www.viten.no and is co-editor for Nordic Studies in Science Education.

Will Morony – Australian Association of Mathematics Teachers

As Executive Officer of Australia's national association for teachers of mathematics my work has an emphasis on informing and supporting 'change'. The scale for these changes ranges from the individual teacher - through, for example, materials and initiatives to assist teacher professional development - through to the national - in relation to curriculum, policies and programs. The extent to which 'design' principles can guide my work varies with the locus of control for the program funding, but my goal is to increasingly work and argue from a design-based perspective.

Jean-François Nicaud – University of Greboble

Jean-François Nicaud is a Professor in computer science at the Grenoble 1 University. His research is devoted to ICT systems that help students learn algebra. He works in this field since many years and at many levels, from building of theoretical frameworks to designing and implementing software. With a few colleagues and students, he has developed an Interactive Learning Environment for algebra called Aplusix. The last version of Aplusix combines a microworld and CAS-like commands (CAS standing for Computer Algebra System) and is currently distributed in France, UK, Italy and Benelux. Jean-François Nicaud is also concerned by student modelling in algebra and is responsible of a pluridisciplinary project aiming at recognising students' conceptions in order to improve our knowledge on the students' learning, as well as the teaching of algebra.

Daniel Pead – Shell Centre for Mathematical Education, University of Nottingham, UK

I have been working on the design and development of educational software since 1984 - including small applets for mathematics education, multimedia products (I made major contributions to the design of the Bowland Maths professional development materials) and computer-based assessment (design of problem solving tasks for the World Class Tests project). A recurring interest is how to produce computer-based materials which support and encourage good teaching and assessment practice, ensuring that the technology is a means to an end, not an end in itself. Technology can greatly enrich teaching and assessment, but over-enthusiastic use may also promote a reductive, over-structured approach which is anathema to many current pedagogical aspirations (such as true formative assessment and promotion of thinking skills and less structured activities). I feel that a key solution to this is to promote a better mix of educational and technological skills amongst software designers, to ensure that the products match the pedagogical objectives. I have recently completed a PhD on the subject of computer-based assessment in mathematics. I am currently secretary of ISDE.

Elizabeth Difanis Phillips – Michigan State University, USA

My on-going interests are in the teaching and learning of mathematics with a special interest in teaching and learning algebra. In addition to authoring numerous papers and books, I am a co-author of *The Connected Mathematics Project* (CMP 1), an NSF-funded project to write, test, and implement a complete mathematics curriculum for the middle grades (1991–1997) and CMP 2 (2000-2006). I am also a principal investigator for a NSF funded project, the *Center to Study Mathematics Curriculum* (CSMC 2004-2009). This is a partnership consisting of Michigan State University, The University of Missouri, and Western Michigan to promote leadership and research on all aspects of curriculum, in particular, as curriculum relates to student and teacher knowledge. My current work is developing on-line professional development materials using classroom videos to support the implementation of CMP.

Editors note: Elizabeth shared a 2008 ISDE Prize with Glenda Lappan, for her work on *Connected Mathematics*.

Matthew Rascoff – Wireless Generation, USA

Matthew Rascoff (mrascoff@wgen.net) is a Product Manager at Wireless Generation, a technology company that creates innovative tools, systems, and services to improve the quality of education. He serves as an adviser to the venture philanthropy Echoing Green on its annual selection of social entrepreneur fellows. He is also on the founding board of Brooklyn City Prep, a charter hybrid high school launching in 2011. Previously, he co-founded the strategy group at Ithaka, an incubator of technology ventures that serve global higher education. Matthew's experience also includes Google, where he worked on the Book Search operations team, and Katzenbach Partners, a strategy consulting firm. After undergraduate studies at Columbia University Matthew did graduate work at Bogazici University in Istanbul on a Fulbright Scholarship. He also earned an MBA from Harvard Business School.

Alan Schoenfeld – University of California at Berkeley, USA

Alan Schoenfeld is the Elizabeth and Edward Conner Professor of Education and Affiliated Professor of Mathematics at the University of California at Berkeley. After obtaining his Ph.D. in mathematics he turned his attention to issues of mathematical thinking, teaching, and learning. His work has focused on problem solving, assessment, teachers' decision-making, and issues of equity and diversity. His most recent book, *How we Think*, provides detailed models of human decision making in complex situations such as teaching.

Christian Schunn – University of Pittsburgh, USA

Christian D. Schunn is a Research Scientist at the Learning Research and Development Center, and an Associate Professor of Psychology, Intelligent Systems, and Learning Sciences and Policy at the University of Pittsburgh. He received his PhD in Psychology from Carnegie Mellon in 1995. His educational design work includes: a system for writing instruction via web-based peer review; mathematics instruction through Lego robotics; and integrated math, science, and engineering instruction in the context of science classrooms. Recently he has been exploring the connections between engineering design processes and educational design processes. He is chair-elect of the ISDDE Executive and the co-chair of ISDDE 2011 in Boston.

Jean Scrase, Nuffield Foundation, UK

Jean has 20 years experience of science education, in particular curriculum development, resource production and the development of associated training. Following a brief period of science research in industry, Jean trained to teach in further education, where she taught for twelve years. During this period she was seconded to the Nuffield Science in Practice team where she supported centres set up the then new GNVQ Science qualification. In 2000, Jean co-founded 4science. The company developed resource materials to support applied science qualifications, and carried out project work for a number of science organisations including the RSC, IoP and ASE. After leaving 4science Jean became the Head of Learning and Development for Salisbury Healthcare Trust, and then went free-lance before joining the Nuffield Foundation Curriculum programme in January 2008, part-time, with responsibility for the continuing professional development of teachers associated with Nuffield Curriculum projects. Also, in January 2008, Jean took on her current part-time role within the Gatsby Science Enhancement Programme.

Max Stephens – University of Melbourne, Australia

My current research uses number sentences involving two unknown numbers to identify some key junctures between relational thinking on number sentences and an ability to deal with sentences involving literal symbols. I have developed a questionnaire which focuses on how students are able to make generalisations on sentences involving two unknown numbers, and how these influenced their performance on sentences involving literal symbols. The questionnaire has now been translated and used with success in China, Brazil and Indonesia as well as in Australia. It aims to identify some key linkages as students make a transition from arithmetic to algebra.

Malcolm Swan – Centre for Research in Mathematics Education, University of Nottingham, UK

Malcolm is Professor of Mathematics Education at the University of Nottingham. He leads the CRME design team, playing the principal role in the design and development of many of its products. His research is mainly into the theory, development and evaluation of teaching situations and professional development in mathematics education. This includes: the design of situations which foster reflection, discussion and metacognitive activity; the design of situations in which children construct mathematical concepts and develop problem solving strategies; and the design of formative and evaluative assessment. Malcolm has recently led the design of curriculum and professional development resources that have been sent to all mathematics teachers in Further and Secondary Education in England. In 2008, Malcolm was awarded the ISDDE Prize in Educational Design, for *The Language of Functions and Graphs*. He is chair of this year's conference.

Betsy Taleporos – America's Choice, USA

Betsy Taleporos is the Director of Assessment for America's Choice. She manages all the research, evaluation, and assessment work for this organization which has had a major impact in the Standards-Based education movement and in national School Reform efforts. She is responsible for the development of approximately 300 mathematics and literacy assessments, including performance based and multiple choice formatted tests, all of which are curriculum embedded and are directly linked to classroom practice. Prior to joining America's Choice, she managed large-scale test development projects in English Language Arts and Mathematics for several major national test publishers. Before that, she directed the assessment efforts in New York City managing the efforts in test development, psychometrics, research, analysis, administration, scoring, reporting and dissemination of information. In that capacity she also served as the New York City site coordinator for the New Standards project. Betsy brings a strong background and expertise in areas of practical application, aligning instruction and standards and assessments, and in academic research and teaching at the graduate and undergraduate level for New York University, Adelphi University and Long Island University.

Anne Teppo

Anne Teppo has been retired from teaching at the university level for over ten years but remains active in the mathematics education community. Her interests include the development of tasks intended for pre-service and in-service primary teachers and the analyses of the mathematical structure of elementary mathematics topics. She is presently working with Marja van den Heuvel-Panhuizen of the Freudenthal Institute on a mathe-didactical analysis of the number line. In the area of task design, she collaborated with Marja van den Heuvel-Panhuizen on a Short Oral at PME 31 (2007) and a paper presented at a workshop at the University of Nottingham (2007). She presented a paper at ISDDE in 2008, conducted a Seminar on aspects of task design at PME 32 (2009), and presented a paper on the mathematical analysis of multiplication/division inverse relations at an advanced study colloquium at Irish College, Leuven, Belgium (2010).

Willem Uittenbogaard – Freudenthal Institute, University of Utrecht, Netherlands

Willem Uittenbogaard is Professor of Mathematics Education at INHolland University — a teacher training college in the Netherlands — and a researcher at the Freudenthal Institute. With more than 38 years of experience in pre- and inservice development in the Netherlands and abroad, he is a frequent workshop leader with Cathy Fosnot. He was one of the co-founders of the Mathematics in the City program and spent two years in residence in New York City teaching at the center and working in New York City schools. He is now working as a researcher in a project called Curious Minds, in which young children (3-5 years of age) can improve their skills in the fields of mathematics and science.

Geoff Wake – University of Manchester, UK

Geoff Wake is a senior lecturer in mathematics education at the University of Manchester where he teaches on a range of courses and is heavily involved in research and curriculum development projects particularly in curriculum and assessment in applications of mathematics. For over a decade Geoff has worked in establishing alternative courses in post-16 mathematics in England: Free Standing Mathematics Qualifications and AS/A levels in Use of Mathematics. He has recently been working with colleagues in Europe on projects that seek to support mathematical modelling and enquiry and interdisciplinary approaches to mathematics and science. His most recent research has investigated transitions for students through phases of mathematics education.

Anne Watson – University of Oxford, UK

I am Professor of Mathematics Education at Oxford University, having come here as Lecturer in Educational Studies (Mathematics) and a Fellow of Linacre College in 1996. My first degree and MSc are in Pure Mathematics, my DPhil and subsequent research are in Mathematics Education. I am currently on the Advisory Committee on Mathematics Education. Before I came to Oxford I had taught mathematics for several years in two comprehensive schools, Stantonbury Campus, Milton Keynes, where I was eventually Head of Year, and Peers School, Oxford, where I was Head of Mathematics.

Steven Watson – Centre for Research in Mathematics Education, University of Nottingham, UK

I joined the Centre for Research in Mathematics Education, university of Nottingham in January 2010 as PhD student researching the design and impact of professional development materials for secondary mathematics teachers. Prior to this I was head of mathematics in state secondary school in Lincolnshire, I have also taught in state secondary schools in Grimsby and Cleethorpes. I was late entrant to the teaching profession having completed a degree in Chemical Engineering and worked in telecommunications.

Emma Woodley – Nuffield Foundation, UK

Emma Woodley is Project Head for Science at the Foundation, working on Twenty First Century Science, and other projects including Key Stage 3 (age 11-14 in England and Wales) STEM, and Practical Chemistry, a joint project with the Royal Society of Chemistry.

This list may go on the ISDDE website after the conference, so if you have any additions or corrections, please send them to Daniel.

Full list of delegates

Jacqueline Barber	Lawrence Hall of Science	Suzanna Loper	UC Berkeley
Alan Bell	Shell Centre	Katja Maass	University of Freiburg
Paul Black	King's College London	John Mason	Promoting Mathematical Thinking
Peter Boon	Freudenthal Institute	Susan McKenney	University of Twente
Mary Bouck	UC Berkeley	Marijn Meijer	Freudenthal Institute
Hugh Burkhardt	Shell Centre	Robin Millar	University of York
Nichola Clarke	Shell Centre	Sonja Mork	University of Oslo
Rita Crust	Shell Centre	Will Morony	AAMT
Christine Cunningham	Museum of Science, Boston	Jean-François Nicaud	University of Grenoble
Phil Daro	UC Berkeley	Daniel Pead	Shell Centre
Frank Davis	TERC	Elizabeth Phillips	Michigan State University
Leslie Dietker	Michigan State University	Matthew Rascoff	Wireless Generation
Sheila Evans	Shell Centre	Alan Schoenfeld	UC Berkeley
Robert Floden	Michigan State University	Christian Schunn	LRDC, University of Pittsburgh
Alex Friedlander	Weizmann Institute of Science	Jean Scrase	Nuffield Foundation
Frans van Galen	Freudenthal Institute	Max Stephens	University of Melbourne
Charlie Gilderdale	NRICH Project	Malcolm Swan	Shell Centre
Louis Gomez	University of Pittsburgh	Betsy Taleporos	America's Choice
Angela Hall	Nuffield Foundation	Anne Teppo	
Berit Haug	The Norwegian Centre for Science Education	Willem van Uittenborgaard	Freudenthal Institute
Ian Jones	Shell Centre	Geoff Wake	University of Manchester
Vinay Kathotia	Nuffield Foundation	Anne Watson	University of Oxford
Elizabeth Kimber	Nuffield Foundation	Steve Watson	Shell Centre
Glenda Lappan	Michigan State University	Emma Woodley	Nuffield Foundation