

## **MatRIC Advisory Board and Leadership Forum**

Friday, 27 November 2015

There are several members of the Management Board who are unable to be with us at this meeting and it is inappropriate to treat this as a Management Board meeting. However, it is an opportunity for the MatRIC team, leaders, network coordinators, etc. to meet with the International Advisory Board to reflect on and discuss the development and future direction of MatRIC.

I will not follow the pattern of Leader reports to the Management Board. My intention is to focus on key themes within MatRIC's activities that, I hope, will guide and inform our discussion in the forum. I will address the following:

- Innovation (networks, events, production)
- Research (small grants, projects, PhD fellowships)
- Communication and dissemination (web site, newsletter, etc.)
- MatRIC Drop in (Mathematics support)
- Impact and sustainability

### **Innovation**

MatRIC now has five networks. Computer Aided Assessment (CAA), Mathematical Modelling, Simulation & Visualization, Teacher Education, and Video. Note the change in title from 'working group', 'networks' seemed to be a more accurate description. Also note the separation of Computer Aided Assessment and video from one working group to two networks.

Except for Teacher Education each network has held a national event that has extended over two or three days. The events have drawn in international expertise and brought together many mathematics teachers from Norwegian universities and university colleges. The networks' activities have been varied.

Morten Brekke (Coordinator of the CAA network) has decided to drop use of the Pearson produced MyMathLab in favour of more versatile software SOWISO developed in The Netherlands. It will be good to see more external action and interest in this network. Nationally at HE level, across all subject fields there are developments to introduce more digital assessment. A group from Newcastle University, who had contributed to the CAA colloquium in Bergen asked if they could attend the annual conference. We have taken this as an opportunity to hold an additional session outside the published conference to stimulate discussion and networking in CAA.

The Mathematical Modelling network held a successful colloquium at the end of May which has resulted in new lines of interest and collaboration with mathematics teachers and researchers, especially with one of our collaborating institutions NMBU. Also, this network has been active in working with bioCEED another Centre of Excellence in Higher Education. A team from UiA led by Yuriy Rogvchenko has been to Bergen on five occasions during the year to work with students and mathematical modeling in the context of Biology. This is only in its pilot phase, the response from the students is very good but evidence needs to be systematically collected and interpreted to make a convincing case to the mathematicians and biologists at Bergen. Further activity is planned for later in the spring.

Per Henrik Hogstad organized a successful symposium on visualization and simulation at the end of May. This has resulted in new contacts at other universities who are being drawn into other MatRIC activities (e.g. Knut Mørken from UiO is contributing to the MatRIC/NTNU teaching course). Per Henrik has continued developing his simulation and visualization program SimReal, in particular he is making efforts to improve the user interface and explore connections with the videos published on MatRIC TV.

The Teacher Education network has not been very active. However, many of the MatRIC small research grants have gone to projects within Teacher Education. We are in the process of appointing a PhD fellow who will research within this network. There have been recent attempts to stimulate action within the group at UiA, it is too soon to see whether these will bear fruit.

The video network is perhaps closest to my vision for MatRIC. MatRIC was invited by the Norwegian Association of Higher Education Institutions (UHR) to join and then take the lead in the production of video materials to support the transition of students from school to higher education. We joined an existing committee (Morten Brekke was already in this committee) from which an editorial group was drawn. UHR was committed to investing 0,5 million NOK in this project, we decided that MatRIC should match this. Tom Lindstrøm from UiO was asked to lead the editorial group (following discussion between Arvid, Frode and Simon); it was felt that he had the respect to unite a group of mathematicians in this project. The editorial group invited a small number of mathematics teachers to form a production team, again led by Tom Lindstrøm. The production team has met on two occasions – each for 4-5 days – at Grimstad during which time they have produced the first videos to be published on MatRIC TV. The videos were then presented and discussed critically at the MatRIC Video colloquium held in Tromsø in October. This activity has therefore:

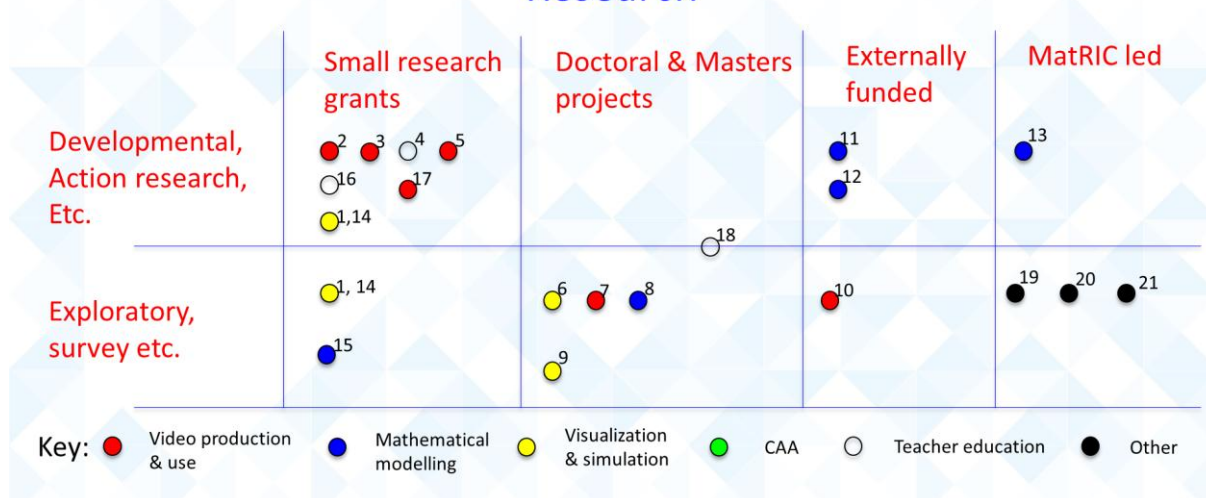
- Brought together mathematics teachers from several institutions to work collaboratively within a developmental project.
- Supported the development of knowledge and expertise in the production of video as a medium for teaching.
- Stimulated a critical discussion about teaching resources that will lead to improvement in teaching – beyond video as a medium of instruction.
- Resulted in a product, a resource for teaching and learning that is available on the MatRIC web-site.
- Contributed to the development of the Norwegian community of higher education mathematics teachers. And it has been a very enjoyable enterprise.

Parallel to the above production, Morten Brekke is engaged in translating into Norwegian video resources that we have acquired under license from Loughborough University. We have received a lot of support from Tony Croft and Janette Matthews in this project.

## **Research**

At the joint Management Board – International Advisory Board meeting in November 2014 a significant part of the discussion focused on MatRIC's research agenda. Thanks to an idea from Rolf Biehler's group in Paderborn I present here a visual summary of research within MatRIC.

## Research



- 1: Said & Per Henrik: Use of SimReal with teacher education students.
- 2: Christine Lindstrøm et al.: Use of Khan Academy resource within a teacher education programme.
3. HiOF: Flipped classroom approach
4. Kellrun HiB: Students presenting research
5. Ragnhild Johanne: Development of video tutorial that promotes relational understanding
6. Ninni Marie Hogstad: How digital tools can be used in learning integrals (curves and surfaces)
7. Helge Fredriksen: Flipped classrooms, final project proposal not yet submitted
8. John Liakos: Mathematical modelling, project proposal not yet submitted.
9. Harald Hoven Gautestad: Masters project – engineering students learning through SimReal
10. RCN proposal (under review) How students use videos in their learning.
11. RCN/SIU proposal International collaboration – doctoral education and RUME (proposal did not receive funding, but we pursue the ideas and collaboration).
12. NIL Norway project with Brno university of technology METMAS – mathematics education through modelling authentic situations.
13. Collaboration with bioCEED, UiB developing mathematical modelling approaches for biology students.
14. Replication of 1. with revised resource.
15. Collaboration YR, OV, PHM, ST: Mathematicians views of modelling
16. Kellrunn et al. HiB: Teaching and learning about indices and their application in society
17. bioCEED collaboration: development of video resource for teaching statistics.
18. New PhD position to be filled – in teacher education
19. Olov – development of students’ discourse in modelling contexts.
20. Olov – Role of mathematics in engineering programmes a comparative study across institutions and countries.
21. OV & EN – Mathematicians views of teaching mathematics to non-specialists

Four of the projects MatRIC that supported with small grants in 2014 have delivered a report (1, 2, 3 & 4), the fifth project (5) is on-going, but was reported at the video colloquium in October. During 2015 MatRIC made four small research grants – two have gone to researchers within UiA (14, 15), one to Bergen University College (16), and one to a collaborative project with bioCEED that relates to the production of teaching videos for statistics (17).

MatRIC has three PhD fellows (6, 7, & 8), a fourth (related to mathematics teacher education) is well into the appointment process (18) and a fifth (to focus on developments in teaching mathematics at higher education – not shown in the diagram) is to be announced very soon.

### **Communication and dissemination**

We invested heavily in the development of the web-site, especially to host the videos produced. Combined with the MatRIC Newsletter, which is now sent to about 300 subscribers, the web-site is the central pillar of our communications. Facebook and Twitter are also used to keep ‘friends’ informed about what is going on. Other means of communication are also used – e.g. the e-newsletter of the Norwegian Mathematical Society (INFOMAT), and the e-mail list of the mathematics teacher education network. Surveys following MatRIC events reveal that most attend as a result of personal invitations – so I sent about 70 personal e-mails inviting to this year’s conference.

MatRIC events – during 2015 we held Visualization and Simulation symposium; Mathematical Modelling Colloquium; Computer Aided Assessment Colloquium, Video Teaching Colloquium; and the annual conference. These have been held in Agder (Kristiansand and Grimstad), Bergen, Tromsø and Trondheim. The events form the centre piece of the dissemination strategy. Attendance at the events varies between 30 and 40, the conference this year has between 60 and 70 participants signed up.

Opportunities to take the message of MatRIC to national and international audiences are also taken up whenever possible. Included amongst these is the NOKUT produced SFU Magazine (Line represents MatRIC in the editorial group).

The teaching course that MatRIC is providing with NTNU is also an attempt to disseminate good practice and encourage networking between mathematics teachers. The first meeting of the course directly precedes the conference. We expect 13 participants. The course is spread over three meetings, two-three days in November, two days in March and one day in June.

### **Mathematics support – MatRIC Drop in**

The opening at the start of the autumn semester of two Drop in centres at UiA, one each on the Kristiansand and Grimstad campuses providing 20+ hours per week for mathematics support has been very warmly received by students and colleagues. The ‘centres’ are at a very early stage of development. The leaders – Anne Berit Fuglestad and Svitlana Rogovchenko - have visited Dublin and Loughborough to get ideas, also Tony Croft spent two days with us in August to give advice, strategic and pedagogical. The response and use by students is satisfactory, but as experience elsewhere has shown it takes effort to get the message out and show students the way to the centre. We are still quite early in the learning curve.

The support from university leadership has been very positive and we are hopeful that the university will eventually take these centres over and thus ensure their sustainability.

### **Impact and sustainability**

We have evidence of positive reactions to MatRIC's events and actions. Unsolicited comments from colleagues about changes in practice, or students about the value of the Drop in, and responses to the evaluation questionnaires that we send out after every MatRIC event show that MatRIC is having an impact. Higher Education mathematics teachers are now coming together to talk about teaching, and there is collaborative engagement in teaching development that is without doubt the result of MatRIC's actions.

We have not started to inquire any more systematically into development in teaching, or students' learning and performance. Frode Rønning is participating in a project with Rolf Biehler's group that is focusing upon the impact of their group. We hope the soon to be announced PhD fellow will also focus her/his research in this direction and Frode will be one of the supervisors.

In my opinion, if MatRIC's funding were taken away, none of the actions that MatRIC has initiated would continue. The actions have not yet become so established in the local (UiA) or national communities that they are perceived to be worth holding on to. For example, if MatRIC did not support participation in events with accommodation and food it is unlikely that the events would be viable. However, MatRIC is not quite two years old, MatRIC is known and felt within the Norwegian (and a good deal of the international) community. We must continue to work on our agenda.

### **Areas for concern:**

- Limited involvement of students in planning, participation and implementation of MatRIC actions.
- MatRIC leadership and coordinators spread thinly – impact is lost.
- Proportion of MatRIC's budget allocated to personnel, but we need more people.
- How to show “whats in it for me” for our colleagues? We would like more involvement and for colleagues at UiA to see that MatRIC is an opportunity and a resource for them.
- Student performance in mathematics at UiA (not so good, as is also the case most places). MatRIC does not have its “own” students. How can we contribute so that students studying mathematics at UiA really feel that they attend a university that has a centre of excellence in education?