

MatRIC Centre for Research,
Innovation and Coordination
of Mathematics Teaching



Centre of
Excellence in
Education

How are we doing?



UNIVERSITY OF AGDER

In collaboration with:



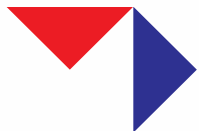
NTNU – Trondheim
Norwegian University of
Science and Technology



Matematikkenteret
Norsk senter for matematisk opplæring



Norwegian University
of Life Sciences

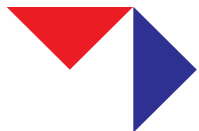


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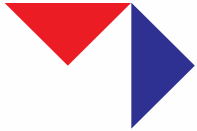
NOKUT goals for the SFU programme (2016):



NG1: The SFU initiative represents a focused and long-term effort in order to stimulate the development of education and innovative approaches in higher education at the bachelor and master levels.

NG2: The ambition of the initiative is to contribute to the development of excellent quality in higher education and to highlight the fact that teaching and research are equally important activities for universities and university colleges.

NG3: A significant element of the initiative is to promote excellence in R&D-based education. The SFU initiative is designed to further and reward the work that takes place in the interaction between students, academic staff, support services, the labour market, professional bodies and the wider society, as well as the knowledge base of educational activities. The initiative seeks to contribute to developing new forms of student involvement and partnership.

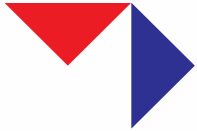


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NOKUTs expectations of the SFU programme.



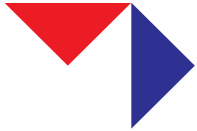
The SFU initiative shall

NE1: stimulate universities and university colleges to establish and develop academic communities that offer excellent education.

NE2: contribute to knowledge-based analysis and development of teaching and learning and that this underpins quality enhancement and innovation.

NE3: contribute to stronger interaction between higher education and the relevant societal and professional fields.

NE4: contribute to the sector-wide development and dissemination of knowledge and practices.

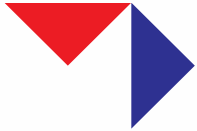


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NOKUTs requirement for SFU actions.



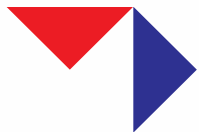
An SFU must therefore

NA1: offer excellent R&D-based education.

NA2: develop innovative ways of working with R&D-based education

NA3: encourage student engagement and ownership of learning

NA4: contribute to the development and dissemination of knowledge and practices about the design of teaching and learning environments that are conducive to learning

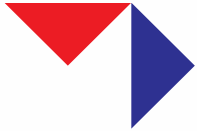


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MatRIC goals as set out in the original proposal



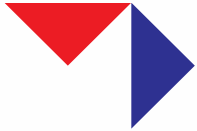
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Vision:

MatRIC will lead innovation, research and excellence in mathematics teaching and learning within higher education 'user programmes'.

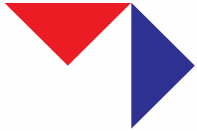


Goals

MG1: Create, lead and support networks that enable sharing and development of effective use of video, digital and web-based technologies in teaching, learning and assessing mathematics. [NG1]

MG2: Initiate, support and disseminate research into teaching, learning and assessing mathematics to identify, understand and evaluate effective innovation in practice. [NG2, NG3]

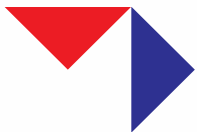
MG3: Bring together mathematics educators, scientists, engineers, computer scientists and economists in cross-disciplinary teams to produce workplace simulations and realistic tasks for mathematical modeling. [NG1, NG3]



Observation:

MatRIC Goals set in 2013 are only a fuzzy image of NOKUT's 2016 goals for the SFU programme.

As we prepare for the evaluation we will compare MatRIC's actions, achievements and impact against NOKUT's 2016 goals.

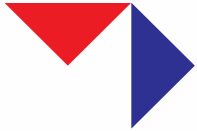


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MatRIC's intentions



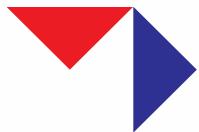
The MatRIC vision will be achieved through

ME1: Networking mathematics teachers and users (engineers, scientists, economists, teachers, etc.).

ME2: Coordinating research into innovation in teaching, learning and assessing mathematics.

ME3: Developing teaching resources that simulate applications of mathematics in the workplace and a student laboratory for developing competencies in mathematical modeling.

ME4: Disseminating research, innovation and excellence in mathematics teaching.

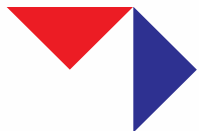


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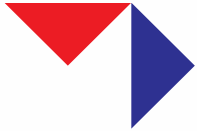


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MatRIC's promised actions

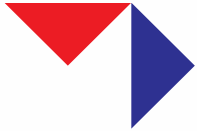


MA1.1 Develop a web-site – resources and information	done, resources?
MA1.2 Annual conference	done
MA1.3 Regional workshops	done
MA1.4 Visits to international centres of excellence	done
MA2.1 Survey of sources of research evidence	done in part + PhDs
MA2.2 Survey current efforts for innovation	not systematically
MA2.3 Small research grants	done
MA3.1 Develop workplace simulations	planned (PIC Math)
MA3.2 Student modelling workshops – in vitro/in vivo	bioCEED collaboration
MA4.1 Publish a newsletter	done
MA4.2 Establish a professional journal	not done, NOMAD TI

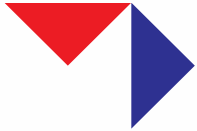


MatRIC actions not set out in the proposal document

- MA5 Development of mathematics support, Drop-in, revision sessions
- MA6 University level mathematics teaching course
- MA7 Network development
- MA8 Annual 'Open lecture' Upper secondary classes invited
- MA9 PhD fellowships + Post Doc. researcher
- MA10 MatRIV TV – UHR/MatRIC collaboration
- MA11 International collaboration – MEC, BUT, ASU, SDSU, BYU
- MA12 Mathematics lunches
- MA13 Hosting visiting PhD fellows from Czech Republic & SDSU
- MA14 Students projects – web-based learning platform, master dissertations
- MA15 (Planned) Student Teaching Assistant development
- MA16 FoU Based teaching



NOKUT			MatRIC		
GOAL	EXPECTATION	ACTION	GOAL	INTENTION	ACTION
NG1	NE1 NE4	NA1 NA4	MG1 MG3	ME1	MA- 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 4.1, 4.2, 5, 6, 7, 10, 11, 12, 16
NG2	NE2 NE4	NA2 NA4	MG2	ME2 ME3	MA- 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 3.1, 3.2, 4.1, 4.2, 6, 9, 11
NG3	NE2 NE3	NA3 NA4	MG2 MG3	ME3 ME4	MA- 1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 4.1, 4.2, 6, 8, 9, 13, 14, 15



[MA1.2] Achievement:

Conferences (attendance in parentheses): 2014 (90), 2015 (62), 2016 (78).
Positive evaluations received.

Impact:

Participants reported that the conferences would be very likely or possibly affect the way they teach: (2015: 26%, 46%); (2016: 17%, 65%)

Challenges:

Need to get broader participation – to reach more mathematics teachers in more institutions.
Need to make a greater focus on what ‘excellence’ in teaching mathematics means.

[MA1.3] Achievement:

Workshops, Symposiums, colloquiums, etc. - 2014: Video WS, Bergen (28); 2015: Modelling Coll., Kristiansand (42); Visualization & Simulation Sym., Grimstad & Kristiansand (38); Computer Aided Assessment (CAA) Sym. Bergen (31); Video WS, Tromsø (35); 2016: CAA Coll. Newcastle, UK* (20); Video/flipped classroom Sem., Narvik (51); Mathematical Modelling Sym. Kristiansand (28); Teacher Education(1) WS, Kristiansand (84); Teacher Education(2) WS Kristiansand. (22)**.

* By invitation. Joint arrangement with Newcastle University. ** By invitation.

Impact:

Participants report high levels of satisfaction in evaluation surveys completed after each event. On average 67,5% of participants claimed that their participation was very likely, or likely to have an impact on the way they teach.

Challenges:

Capitalizing on the investment in 'events' – following up events with encouragement of participants to work on their practice.

[MA1.4, MA11, MA13] Achievement:

Visits to international Centres of excellence.

MatRIC has established strong links with several international centres: MEC Loughborough (Centre meetings in 2014, 2015, & 2016). KhDM, Paderborn (visit 2015), ASU, SDSU (visited 2016 with reciprocal visits in 2016); BYU (2016, with reciprocal visit). Also links with Brno University of Technology and Masaryk University supported by EEA Norway grants.

Impact:

Engagement in research and development projects: MEC – NOMAD TI; KhDM – Frode Rønning participation in impact study; ASU & SDSU – SG (and master students' participation in research projects; BYU – YR participation in PIC-Math and bring this project to Norway; collaboration with institutions in Czech Republic has led to the development of Mathematics Support Drop-in there. Visiting PhD fellows who have come to spend some weeks at UiA.

Challenges:

Expensive in terms of time and money.

[MA1.1] Achievement:

Web site, www.matric.no has been developed.

Impact:

Not clear, but MatRIC TV has gained attention and positive reaction.

Challenges:

Has been a major investment of funds. Further development is required: Better organization in some areas that are now growing quite large. Easier access to statistics about usage.

[MA4.1] Achievement:

Newsletter: Distributed by e-mail to about 400 addressees.

Impact:

About 45% of addressees opened the e-mail and about 30% of addressees clicked on a link to matric.no to find further information.

Challenges:

Communication with MatRIC's target audience remains a challenge. Personal contact and individual e-mails are most effective – but time consuming. 200 individually addressed personal e-mails were sent with conference invitations in 2016.

[MA2.1, 2.2, MA9] Achievement:

Surveys: Olov Viirman – survey of research into video usage in university mathematics teaching. Paper submitted to IJRUME + presentations at MatRIC events. YR, OV, 2 colleagues from Loughborough – Survey of mathematicians' use of mathematical modelling in teaching and professional practice. Supported by MatRIC small research grant. 5 PhD fellows – literature reviews for their research

Impact:

Impact of these surveys is yet to be determined.

Challenges:

Conducting and reporting surveys is a difficult and time consuming task.

Need to contact “The Norwegian Knowledge Centre for Education”

<http://www.forskningsradet.no/prognett-kunnskapssenter/KSUEN/1247146862459?lang=en>

[MA2.3] Achievement:

Small research grants

Distributed in 2014, 2015 and 2016. Researchers in several Norwegian institutions have received grants and reported their work (reports available at matric.no). UiA, HiB, UiT, HiØstfold, HiOA, HSN.

Impact:

Grants received by UiA colleagues Said Hadjerrouit and Per Henrik Hogstad have resulted in changes to the user interface of the software SimReal that PHH has been developing over many years. In this project students are engaged in the research and development activity.

Challenges:

Evaluating the impact of small research grants objectively is difficult. Need to send a survey to everyone who has received such funding.

[MA3.1, 3.2] Achievement:

Mathematical modelling: Collaboration with bioCEED (SFU). Generation of data that exposes challenges of teaching mathematics to biology students (motivation, competence, etc.). Planned: PIC Math Norway; Masters collaboration.

Impact:

Further collaboration with bioCEED is planned to consolidate impact of findings from the research and development activity. Modelling Colloquium 2016 has inspired one UiA Grimstad colleague to work on part of his teaching programme in collaboration with a Mathematics Education researcher from Kristiansand.

Challenges:

Mathematical modelling is used in a very large and varied field of scientific activity. With limited resources it is only possible to focus on a narrow area (e.g. mathematical modelling in biology). This activity opens opportunities to engage with local industries and businesses – we have good contact with consortium leaders, but need to develop contacts with individual users of mathematical modelling in the work place.

[MA5, MA15] Achievement:

Student learning support: Drop-in support centres have been established on both campuses. These are being well used by students, who value the support offered. A presentation 'How to study mathematics' was piloted in 2015. Revision support for first year engineering students. Recruitment and training programme for student teaching assistants is planned for 2017. Creation of student advisory groups.

Impact:

Difficult to evaluate impact in the short term. It is hoped that there will be fewer failures and drop-outs, better performance and progression through the programmes affected. However, data from one or two years will not be sufficient to demonstrate impact conclusively.

Challenges:

Location for the Drop-in: small room in good location at Grimstad, Excellent room in poor location in Kristiansand. Making the Drop-in service known to all students studying mathematics. Collecting data that will support a case for continued funding for the Drop-in centres. 'How to study mathematics' presentation has not been repeated due to inadequate leadership resources (or delegation!)

[MA6] Achievement:

Teaching course for university level mathematics teachers: A pilot course was run through 2015-2016 (three meetings). The course was supported by Heads of Departments at NTNU and UiA. Participants came from NTNU, UiA, NMBU, UiS.

Impact:

Most participants (71%) agreed with the statements: “The course has led me to think more deeply about teaching and learning;” “The course has motivated me to explore new approaches to teaching and learning that I may implement in the future.” One participant agreed with the statement “The course has made a large impact on my development and practice.”

Challenges:

Recruiting a balance of international and Norwegian presenters for the course – especially to attract a person to come a long distance to engage with a very small audience for a relatively short time. Getting the course known by all those who would gain from the activities.

[MA7] Achievement:

Network development: Computer aided assessment; Visualization and simulation.

Impact:

Development of an international group for computer aided assessment that includes international leaders in the field. Computer Aided Assessment – MatRIC may take the major credit for the formation of an international network that met first time at the MatRIC Sym. in Bergen, 2015; then at MatRIC Conference, 2015, MatRIC sponsored the meeting in Newcastle. Fourth meeting at 2016 MatRIC conference. Next planned meeting in Amsterdam, April 2017.

Challenges:

We changed the name 'working groups' to networks to lower the expectation of threshold of participation. The CAA is the most developed, and there is an identifiable network around visualization and simulation. There are many mathematics teachers working with video, and with mathematical modelling but we have been unsuccessful in networking these areas. In Teacher Education networks exist that pre-date MatRIC and the need for networking is not so strong.

[MA8] Achievement:

Open lectures: draw in classes from upper secondary schools in Grimstad and Kristiansand. Attendance has been very good.

Impact:

Challenges:

Open lectures implies people can just 'come along', but this makes it very difficult to plan and prepare.

Pressure on teaching rooms and large auditoriums as the University expands.

[MA10] Achievement:

MatRIC TV: Nearly 70 short videos have now been published on matric.no. Several more are ready to be published. The videos are intended to support the transition from upper secondary to university level mathematics. The formation of a video production group composed of mathematics teachers from UiO, NTNU, HSN, HiOA.

Impact:

MatRIC leads this project at the request of UHR, that shared funding. Collaboration within the production group, and critical engagement with independent mathematicians and mathematics educators has established a productive dialogue in the development of videos. The videos have attracted attention of others who have requested that they be incorporated in other learning resources.

Challenges:

Sufficient technical support from media services. Making the resource that now exists well known and used. Development of the web-site should include the opportunity to gain data about the use of the videos.

[MA12] Achievement:

Mathematicians lunches. Low cost, simple to implement. Mathematics teachers on Kristiansand and Grimstad campuses invited to organize lunches with the cost covered by MatRIC, one condition – at least 10 minutes to talk about teaching. Very often the ‘ten minutes’ extends to an hour or more, teachers come prepared to talk about their practice. Lunches appear to be very popular.

Impact:

An exchange of ideas and experience. The development of a discourse about educational quality and the improvement of teaching and learning. The lunches have established the topic of mathematics teaching as an issue of the professional discourse at both campuses.

Challenges:

Difficult to find a day when all the mathematicians can be present. Rotation of days means a loss of continuity in the discussions.

[MA14] Achievement:

Development of student projects:

Web-based resource for learning programming. In this project students approached MatRIC for financial support. MatRIC provides this, but the finance is managed by the leader of the Student Advisory Group.

Master projects: SimReal, Teachers' Mathematical Meanings.

Impact:

Mathematics teacher at Grimstad sees the potential and value of web-based learning resource – leads to MatRIC initiated collaboration between the teacher and student group.

Challenges:

There are many potential student projects that deserve support. Only a small number related to teaching and learning mathematics and thus align with MatRIC's goals. Projects have to be evaluated carefully to ensure relevance.

[MA16] Achievement:

Development of R & D based teaching: CVB inquiry based teaching see report in NOKUT's SFU Magazine 2016/1:

http://www.nokut.no/Documents/NOKUT/Artikkelbibliotek/UA-enhet/SFU/2016/SFU_Magasinet_01%2016_web.pdf

MatRIC small grant HiB Project Kjellrun Hiis Hauge see report in NOKUT's SFU Magazine 2016/1 (see above link)

MatRIC small grant funded project with Said Hadjerrouit & Per Henrik Hogstad. See report in NOKUT's SFU Magazine 2016/2:

http://www.nokut.no/Documents/NOKUT/Artikkelbibliotek/UA-enhet/SFU/2016/SFU_Magasinet_02_16.pdf?epslanguage=no

Impact:

Challenges:

Going beyond teaching and learning support. Development of student engagement in their learning, course implementation and programme design. Development of R & D based education in all mathematics courses.