



MatRIC Centre for Research,
Innovation and Coordination
of Mathematics Teaching



UiA University of Agder
Norway

MatRIC

Centre for Research, Innovation and
Coordination of Mathematics Teaching

Annual Report for 2021

Introduction

MatRIC is in its eighth year as a center for excellence in education. The center is now well established and many of MatRIC's actions have found their place established at the University of Agder. The learning assistant program is established within the University of Agders center for Learning, UiA PULS. The Drop-in centers at both campuses continue their development. The students have become important partners in these centers. They have taken the initiative to invite new students to use the centers, develop the layout, and spread the word on social media. These centers are now widely known among the students at UiA.

MatRIC continues to perform excellent research in mathematics education in collaboration with the Mathematics Education Research Group at Agder (MERGA). Two more MatRIC PhD fellows have defended their theses. Yusuf Feyisara Zakariya was awarded the Agder Academy of Sciences and Letters prize for young researchers for his research on first-year engineering students' approaches to learning mathematics.

Even if 2021 has been a year with limited possibilities for travel and physical meetings, MatRIC has managed to be a national and international hub for sharing improvements in mathematics teaching and learning in higher education. MatRIC has managed the transition from physical to digital workshops and conferences. The new course for mathematics teacher educators has started. The course has 25 participants from 12 different institutions.

In May DIKU had a digital site visit to MatRIC and UiA. Senior Lecturer Katarina Mårtensson from Lund University was invited as an international expert to evaluate MatRIC's work. The purpose of the site visit is to provide advice to the center about further development and priorities and provide insight and reflections on center development in the context of the center plan. The report from this visit concludes that MatRIC has created an impressive array of multi-layered activities, locally nationally and internationally. MatRIC has come far towards its aim. It is recommended that MatRIC continue to develop a continuation strategy to continue the important work. Katarina Mårtensson writes in the report from the site visit:

“My impression from the site-visit of the center is that they are very engaged and ambitious, and a well-functioning SFU”

MatRIC continues to work towards the vision:

“Students enjoying transformed and improved learning experiences of mathematics in higher education.”

This vision shall be addressed in three focus areas:

- 1) Transforming students learning experiences
- 2) Transforming mathematics teaching
- 3) Research and development-based mathematics education.

1. Results compared to the application and center plan

MatRIC's vision is *"Students enjoying transformed and improved learning experiences of mathematics in higher education."* Students' experiences of learning mathematics are central to this vision. Performance in mathematics in higher education continues to be a cause of national and international concern and MatRIC's activities are targeted to improve mathematics learning for students. As described in MatRIC's action plan for phase 2, this shall be addressed in three focus areas: (1) Transforming students learning experiences, (2) Transforming mathematics teaching and (3) Research and development-based mathematics education. These three pillars of MatRIC's objectives: the transformation of students' learning, the transformation of teachers' teaching, and applied research that informs, explores, and evaluates mathematics teaching and learning in higher education, will advance mathematics education towards MatRIC's vision.

Primary Objective 1: Transforming students learning experiences.

The intention is that students enjoy mathematics and are motivated to engage with the challenges of mathematics. They should feel supported throughout their studies without lowering the cognitive demand to the extent that it interferes with their learning. The intention is that all students are fully engaged as active learners and partners in learning, teaching, and assessment.

Learning Assistants Program

In 2017 MatRIC piloted a two-day, residential training camp for student teaching assistants. This is camp was the start of what now is called the Learning Assistant Program at UiA. MatRIC, together with UiA's Centre for Teaching and Learning, UiA PULS now runs the Learning Assistants Program. The Learning Assistants Program consists of three gatherings for the students. UiA PULS oversees the main topics such as focusing on communication, the meaning of learning, learning styles, active learning, characteristics of a good learning environment and how can this be developed. In addition, each department is responsible for the didactics of their own subject. The mathematics didactic is covered at the Learning assistant camp. Also in 2021 MatRIC invited the mentor program at the Faculty of Engineering and Science FYSE (First Year Study Environment) to join the camp. FYSE and MatRIC share the vision of including students as partners in education. 61 Students participated at this year's camp.

MatRIC Drop-in

The MatRIC Drop-in center is one of MatRICs most important activities. Since the start of the Drop-in centers in 2014, MatRIC has made available 20 hours per week of mathematics support for students to access on each of UiA campuses. However, our Drop-in centers and other similar math support centers internationally, have experienced a lower number of visitors to these centers than expected. Both at MatRIC drop-in and internationally the experience is that there are many students who struggle with mathematics, but still, they do not use the support center to improve their mathematical competencies. Studies suggest that fear of showing a lack of knowledge could be a reason why students do not use math support centers.

In 2021 MatRIC addressed this issue. Eva Dønnestad was appointed to educate our Drop-in tutors in human connection competencies. Human connection competencies mean that one acknowledges that humans' health and well-being are important in a learning situation. The student and the tutor must make connections and acknowledge feelings before one can learn mathematics.

In the students' health and well-being survey (SHoT-Survey) 54% of the students that they feel lonely. Also, as many as 15% of the students report that they have suicidal thoughts. This survey shows that many students struggle with their mental health. With the student's health and wellbeing in mind, MatRIC has focused on inviting new students to use Drop-in and letting them feel welcome.

In addition to focusing on human connection competencies, the senior students that work as tutors in Drop-in, have advertised Drop-in in social media. They have actively invited new students to come and use Drop-in and they have organized quizzes and workshops to attract students. Consequently, the Drop-in location in Campus Grimstad was too small to accommodate all students. In the fall of 2021, the Drop-in center at Campus Grimstad was provided with a new and larger location. The Drop-in tutors have made a new interior design at the new Drop-in location.

The actions MatRIC has taken with the Drop-in centers in 2021 have significantly increased the number of visitors. Drop-in has now between 100 and 200 visitors per week at both campuses. After summer 2021 the Drop-in center in Campus Grimstad moved to a larger room to facilitate all visitors. Drop-in Kristiansand will change location in 2022. The Drop-in center will then be collocated with the university learning center UiA PULS in a prime location of Campus Kristiansand.

The students are strongly included as partners in these centers. The MatRIC student mentors are an important link between the students, the learning assistant, and the faculty. Student partnership is high in MatRIC's priorities, and it is directly related to MatRIC's vision. The development in the Drop-in centers, collaboration with the MatRIC student mentors, and the Learning assistant program are important actions where students act as partners in their education.

Drop-in Kristiansand and Drop-in Grimstad have organized several workshops for students. They have organized LaTeX -seminar at both campuses, and workshops before the exams.

Svitlana Rogovchenko leads MatRIC part in the Capacity Building in Mathematics and Statistics Learning Support in Norway and the Czech Republic (MSLS Net). In the first workshop in Brno in December 2021 the MatRIC Drop-in tutors Preben Forsland, Martin Nordskog and Marjan Daliri presented Drop in. The international community was impressed by the activity MatRIC has in its Drop-in centers.

Mathematics for engineering students

MatRIC continues the collaboration with the First Year Student Environment (FYSE) project. FYSE is an initiative at the Faculty of Engineering and Science to help students through their first year of study. FYSE and MatRIC coordinate a group-based project in the mathematics course for engineering students. The intention is to engage the students in problems where mathematics is applied in an engineering context. The project is developed in collaboration with the mathematics teachers and the teachers in the engineering programs. In the fall semester of 2021, the project contributed 20% towards the final grade. The PhD students Mike Alexander Lund and Alex Ho, together with several faculty, supervised the students. The goal is that real-world problems shall increase the student's self-efficacy and therefore also improve the learning experience of mathematics.

MatRIC has supported the Top Research Centre Mechatronics (TRCM) in their vehicle crash test in December 2021. TRCM investigates how mathematical modeling can contribute towards a design

direction to the vehicle development team to assess injury values for a vehicle crash event. The vehicle crash test was documented with high-speed video. MatRIC will use the videos from the vehicle crash and together with TCRM develop modeling tasks for first-year engineering students.

Mathematics for economy students

We see a lasting cultural change in the mathematics for economics program for students who enroll in the School of Business and Law. Since 2017 MatRIC has organized a pre-course (bridging course) in mathematics for the students that enter the economics program. The bridging course gives no study points, and it is voluntary for the students to participate. At the beginning of the semester, the students are required to complete a specially designed mathematics diagnostic test. Based on the results the students are recommended to participate in modules of the pre-course. MatRIC continues to use learning assistants in this course. The learning assistants and the teachers have weekly meetings. These meetings act as a continuous feedback loop between students, learning assistants, and teachers. This feedback loop includes the students as partners in their education.

The innovations within mathematics for economics have an impact. In June 2021 MatRIC's Ida Maria Langårds and learning assistant Inger Elise Tysvær were invited to "Nokutpodden" to talk about the bridging course in mathematics for economics students. Also the Director of NOKUT (the Norwegian Agency for Quality Assurance in Education) Kristin Vinje points to MatRIC's work in her chronicle in Aftenposten. She argues that bridging courses, like MatRIC have introduced in mathematics for economics, is a solution to increase new students' knowledge in times of the pandemic.

A paper showing that participation in the bridging course has a positive effect on students' examination performance, and hence, we assert, increased inclusivity of all students was presented by Ida Maria Langårds at MNT-konferansen in 2021.

Primary Objective 2: Transforming mathematics teaching.

The overall intention of this objective is to build up the community of practice in mathematics education. MatRIC will continue to facilitate further exchange of experience, expertise, and good practice between mathematics teachers within Norwegian higher education institutions and connect these with international exemplars of best practice in teaching and learning mathematics. Specific objectives in the development of practice are the inclusion of research and development within regular teaching, and the comprehensive inclusion of students as partners in the educational process. MatRIC's actions contribute to UiA's strategy to give credit for teaching quality. MatRIC will support with competence, experience, and resources the teacher's seeking recognition for teaching quality.

Mathematics teaching is a very conservative practice. For many university teachers, chalk and chalkboard are argued to be the best technologies appropriate for teaching higher mathematics. Written school exams have been the traditional method to assess students. The pandemic has forced all teachers to change their teaching and assessments methods. Mathematics teachers have been teaching online and many teachers assessed students via home exams for the very first time. MatRIC has taken national leadership in coordinating the exchange of new experiences due to the pandemic. In January 2021 MatRIC organized a webinar with 130 mathematics teachers from Norwegian institutions. During the webinar mathematics teachers from UiA, UiO, NTNU, UiT and NMBU presented their experience with home exams.

Course for mathematics teacher educators

Norwegian Centre for Mathematics Education at NTNU and MatRIC have initiated a new course for mathematics teacher educators. The goals of the course are to bring together teacher educators with a strong mathematical background, teacher educators who want to qualify as associate professors, and teacher educators who want to improve their teaching and supervision skills. The program gives the opportunity to develop competence in teaching mathematics in teacher education. Linda Opheim and Simon Goodchild from UiA. Raymond Bjuland, Janne Fauskanger and Reidar Mosvold from UiS, and Kjersti Wæge Director, Norwegian Centre for Mathematics Education at NTNU. The course will include high level international speakers. Such as Professor Merrilyn Goos, Professor of Education at University of the Sunshine Coast, Australia, Professor Elham Kazemi, University of Washington Professor Peter Liljedahl, Simon Fraser University, Professor Emeritus John Mason, Open University and University of Oxford, and Professor David A. Reid, University of Agder.

The first cohort of this course started in fall 2021. The first session of the course took place at NTNU and the second session was at UiA. Completion of both parts of the course is credited with 30 ECTS points, and the course is at the forefront of international development in the development of teacher-educator competencies. The course has 25 participants from 12 different Norwegian institutions. This course is an important arena for transforming mathematics teaching in teacher education. With participants from as many as 12 different institutions, we hope to disseminate the quality of teaching and learning mathematic

<https://www.ntnu.no/videre/matematikkdidaktikk>

Computer Aided Assessments

Since the beginning of the SFU-period MatRIC has developed a Norwegian network for Computer-Aided Assessments (CAA). How to use CAA to improve teaching and learning of mathematics is one of MatRIC's goals. MatRIC has also built a strong international network with the world-leading experts in the use of CAA. STACK, developed by Prof. Chris Sangwin at Edinburgh University, is at software under continuously development. The MatRIC Moodle server, which has been a testing server for teachers who wants to test CAA, has several users from HVL, UiS, UiB, NTNU. Siri Ovedal-Hakestad has started as a new PhD fellow in MatRIC. She will investigate how students can use CAA to improve their mathematical learning.

Merit award scheme

In 2018 MatRIC's Morten Brekke became the first Excellent Teaching Practitioner at UiA. The merit scheme is important for the quality culture in higher education and to improve the quality of teaching and increase the value of education for students. In 2021 Associate Professor John Arngrim Hunnes and Associate Professor Torunn Skåltveit Olsen at the School of Business and Law at UiA have been awarded the status of merited teachers. The committee was led by Simon Goodchild from the MatRIC team.

PLATINUM (An Erasmus+ project)

PLATINUM's consortium is established by University of Agder. Yuriy Rogovchenko is the project coordinator and Barbara Jaworski is the Academic leader. PLATINUM connects 8 universities from 7 countries: Czech Republic, Germany, Netherlands, Norway, Spain, Ukraine, and United Kingdom. In all partner universities, project participants teach mathematics or statistics and seek to innovate in their practice.

PLATINUM has organized a series of webinars with top international speakers. These webinars have attracted attendance from the whole of Europe and the webinars are an important arena for networking and dissemination.

- “[Inquiry In University Mathematics Teaching And Learning](#)”, 9th March invited speaker was Professor Michèle Artigue (Paris Diderot University). The academic leader of the project, Professor Barbara Jaworski (Loughborough University) introduced the inquiry basis of PLATINUM.
- “[Bringing Inquiry Into One's Mathematics Classroom](#)”, 7th May. This webinar had Professor John Mason (Open University, UK) as invited speaker
- “[Creating Communities Of Inquiry: Focus On Students With Special Needs And On Mathematical Modelling](#)”, 9th -10th , June. This webinar focused on Communities of inquiry formed by university teachers of mathematics, Design of inquiry tasks suitable for university students with special needs, and on Inquiry and mathematical modeling.

The PLATINUM consortium has finished the book “Inquiry in University Mathematics Teaching and Learning - The PLATINUM Project” In the foreword of this book, Professor Michele Artigue writes: “There is no doubt in my mind that PLATINUM represents an important milestone for the evolution of practices in university mathematics education.”

Primary Objective 3: Research and development-based mathematics education

MatRIC's goals are to transform students learning experiences in mathematics and to transform mathematics teaching. For MatRIC it is highly important that the innovations and actions that MatRIC does are followed by research. In 2021 two more MatRIC PhD-fellows have defended their theses. Two new PhD fellows have started their studies in MatRIC.

Phd- Fellows:

Eivind Rudjord Hillesund defended his thesis “The resource decisions and documents of undergraduate engineering students in mathematics courses” on Thursday 28th January 2021. Supervisors were Professor John David Monaghan, UiA (main supervisor) and Professor Said Hadjerrouit, UiA (co-supervisor). In his doctoral thesis, he looked at how engineering students at three universities in Norway use the resources emphasized in their courses as well as other resources when learning mathematics.

Yusuf Feysisara Zakariya defended his thesis entitled “Undergraduate students' performance in mathematics: Individual and combined effects of approaches to learning, self-efficacy, and prior

mathematics knowledge” on Friday 30th April 2021. Supervisors were Associate Professor Hans Kristian Nilsen, UiA (main supervisor) and Associate Professor Kirsten Bjørkestøl, UiA (co-supervisor). Yusuf is now a pos doc researcher at UiA. Yusuf Feyisara Zakariya will continue to research on engineering students learning of mathematics.

Yusuf Feyisara Zakariya was awarded the [Agder Academy of Sciences and Letters prize for young researchers](#) for his research on first-semester engineering students’ learning of mathematics.

Mahboubeh Nedaie started as a PhD fellow in January 2021. Mahboubeh’s dissertation research project is about learning mathematics at university level, and she is planning to use eyetracking technology and parameters of bio-technology as the main source of data. In broad terms, the plan is that students will learn new mathematical content by interacting with instructional material from computer screen. Shaista Kanwal and Cengiz Alacaci are her supervisors.

Siri Ovedal-Hakestad Started as a PhD fellow in September 2021. Her dissertation research project is about how students can use computer aided assessments to improve their learning of mathematics. Niclas Larson is her main supervisor and Thomas Gjesteland and Jeppe Skott are co-supervisors.

PhD seminar

Together with the University of Agder’s top research center Mathematics Education Research Group at Agder (MERGA), MatRIC organized a PhD seminar 25th November. Jeppe Skott presented the history of mathematics education research and Simon Goodchild discussed the impact of our PhD theses. In addition, the PhD students presented their ongoing work and got feedback from their peers. This seminar is important for networking amongst PhD students within Norway.

NMR-MatRIC Survey of Teaching Approaches

MatRIC has led a national survey of teaching approaches in mathematics. This has been in collaboration with the Norwegian Mathematics Council (NMR). The team has been Kirsten Bjørkestøl, Simon Goodchild and Hans Kristian Nilsen from the MatRIC team and Inger Christin Borge, University of Oslo, and Odd Helge Mjellem Tonheim, Volda University College. Th group has continued its work in 2021. It is hoped to submit a paper to a top-level international journal soon. The paper will report some interesting findings relating to the possible impact of UniPed courses, with some key recommendations for improvements to be considered.

MatRIC Survey of online mathematics teaching and learning.

MatRIC initiated a national survey of online mathematics teaching and learning in Norwegian higher education institutions to explore lecturers’ and students’ experiences and enable the sharing of solutions to the challenges encountered due to the pandemic. Farzad Radmehr and Simon Goodchild developed an instrument over the period April 24 – June 06, and the survey was conducted amongst Norwegian higher education mathematics lecturers at the close of the spring semester 2020. The study shows that it appears that some mathematics teachers were not aware of several challenges that students experienced in the switch from physical to digital teaching. Farzad Radmehr presented this study at the annual conference of the Norwegian Mathematics Council.

2. Dissemination of knowledge and practices.

Within MatRIC's action plan all actions are associated with dissemination. For example, The Learning assistant program, Drop-in, and the Course for mathematics teacher educators, which are mentioned above, are all actions with dissemination embedded. 2021 has also been a year with limited physical meetings. For example, the MatRIC annual conference was canceled in 2021. Even if physical meetings were not possible due to the pandemic, MatRIC successfully organized two important conferences. Both the "MNT-konferansen" and the "The 20th SEFI Special Interest Group in Mathematics - SIG in Mathematics Seminar on Mathematics in Engineering Education" were organized as fully digital events. This section will highlight some of MatRIC's dissemination activities.

New Websites

MatRIC has developed and designed new websites. This has been done in close collaboration with the Division of Communication at UiA, which will support MatRIC in maintaining the websites in the future. The new websites are targeted towards Students, Teachers, and Researchers. The new website is a strategic move towards the continuation strategy of MatRIC. After the SFU-period ends, MatRIC would not have the opportunity to maintain an external website. MatRIC will need support from the Division of Communication to continuously update the website. With the new websites, it is easier for MatRIC to publish news items and MatRIC will collaborate with the Division of Communication in the content. Also, MatRIC TV will be sustainable on the new websites.

MatRIC TV

MatRIC TV is high-quality videos of important topics in mathematics. They are targeted at first-year students. MatRIC has initiated a collaboration with Professor Jo Røislien to make more videos for MatRIC TV. The new videos will focus on statistics, which is an important topic in many study programs. MatRIC hosted a workshop together with Jo Røislien and the learning assistants at UiA, to discuss the content of these new videos. The new videos are under development, and they will be ready for MatRIC TV in 2022.

MatRIC forum

MatRIC forum is a bi-weekly meeting on zoom for the whole MatRIC team. In these meetings, student mentors and student board members meet student board members have also been important in dissemination of MatRIC's work among students at UiA and they have acted as an important student voice to the MatRIC team.

MNT-konferansen (STEM Teaching Conference):

UiA and MatRIC together with Universities Norway (UHR) and Nasjonalt senter for Realfagsrekruttering organized MNT-konferansen (STEM teaching conference) 15th -16th March. The purpose of the MNT-konferansen is to promote the quality and relevance of STEM educations by contributing to a research-based and scientific approach to teaching and learning - SoTL (Scholarship of Teaching and Learning). At this year's conference, 50 papers were presented. The MatRIC team had 5 papers at this conference.

The STEM conference (MNT-konferansen) is a biennial scientific conference on teaching and learning. The aim of the STEM conference is to contribute to the development of a culture for a

scientific approach to teaching and learning within the STEM field – a scholarly approach to planning, carrying out, evaluating, assessing, and reviewing teaching and learning. In other words, fostering a Scholarship of Teaching and Learning (SoTL) culture. To reach innovative pedagogical approaches it is seen as important to stimulate collaboration and knowledge sharing across disciplines, particularly across science, technology, engineering, and mathematics, but also interdisciplinary

The MNT conference is connected to the Nordic Journal of STEM education (NJSTEME). NJSTEME is a scholarly peer-reviewed, open-access journal publishing in the broad field of educational development in Science, Technology, Engineering, and Mathematics (STEM) Higher Education. Publications from the conference are not part of the peer-reviewed section of the journal. The editor in Chief position follows the MNT conference and during the next two years Thomas Gjesteland will be editor-in-chief for NJSTEME.

The 20th SEFI Special Interest Group in Mathematics – (SIG) in Mathematics – Seminar on Mathematics in Engineering Education

MatRIC hosted The 20th SEFI Special Interest Group in Mathematics – SIG in Mathematics Seminar on Mathematics in Engineering Education. 17th -18th June 2021. The SEFI SIG in Mathematics Working Group aims to provide a forum for the exchange of views and ideas amongst those interested in engineering mathematics and promote a fuller understanding of the role of mathematics in the engineering curriculum and its relevance to industrial needs. The organizing committee was Thomas Gjesteland, Lillian Egeland, Morten Brekke, and Elisabeth Rasmussen. Due to the pandemic the conference was fully digital.

MatRICs board member and dean of Faculty of Engineering and Science at UiA Michael Rygaard Hansen and Simon Goodchild were invited to give the keynote plenary talks. Michal Rygaard Hansen addressed mathematical modeling in engineering. Simon Goodchild discussed transformed and improved learning experiences of mathematics in engineering education.

The conference had had 27 contributed papers presented. The students from MatRIC Drop-in presented “Students as partners in the development of math support center”. Here they shared the recent developments at Drop-in.

Per Henrik Hogstad is invited to give the keynote talk at next SEFI Special Interest Group in Mathematics seminar. He will present the development in SimReal and his work in simulation and visualization in mathematics teaching.

Other webinars organized by MatRIC:

- “Webinar om hjemmeeksamen i matematikk”, 27. January. This webinar brought together more than 100 Norwegian mathematics teachers to share their experience on home exam in mathematics.

<https://www.uia.no/arrangementer/matric-webinar-om-hjemmeeksamen-i-matematikk>

- Webinar om SimReal, 17. February. Per Henrik Hogstad presented This webinar discussed simulation and digital tools for mathematics teaching.
<https://www.uia.no/arrangementer/webinar-om-simreal-med-per-henrik-hogstad-ua>
- Webinar on assessment for Students, 3. March. MatRIC invited students from all Norwegian SFUs to discuss assessments in general and assessment during the pandemic. After the webinar two students from MatRIC and one student from BioCEED attended a debate on assessment at the MNT-konferansen.

Examples of MatRIC's impact is shown by many important appointments in national and international committees and organizations by the MatRIC team members:

- Morten Brekke is member of steering committee for European Society for Engineering Education (SEFI) The Mathematics Special Interest Group (MSIG).
- Morten Brekke is a member of the editor board in the journal "Teaching Mathematics and its applications"
- Linda Opheim is a member of the The Norwegian Directorate for Education and Training (Udir) expert group for the exam in mathematics.
- Thomas Gjesteland is Editor in chief in the journal "Nordic Journal of STEM Education"
- Thomas Gjesteland is Board member Norsk matematikkråd.
- Thomas Gjesteland is a member of the "Holmboeprisen" -committee
- Simon Goodchild chaired the Merit award scheme at UiA.

Podcast

Niclas Larson has initiated the new podcast "[Spøkelser etter avdøde størrelser](#)". The podcast discusses various topic related to mathematics. The podcast is targeted to students.

3. Further progress

MatRIC will continue to work according to the action plane for phase 2. Last year has been another year with limited possibility to travel and to organize physical meetings. Even if the main activities in MatRIC have not been influenced by the pandemic, the annual MatRIC conference, and other physical actions and meetings, such as open lecture, has been cancelled in 2021. Some of them, like the MNT-conference and the SEFI-conference have been switched to da digital platform. However, MatRIC plans to have several physical meetings for networking and dissemination in 2022.

MatRIC will focus on the following:

Continuation Strategy

MatRIC is now in its final stage as a center for excellent in education. During the coming years MatRIC will work together with its stakeholders to develop a sustainable continuation strategy. An important part of this work is to include external funding.

MatRIC annual conference

The last two MatRIC annual conferences have been cancelled due to the pandemic. The MatRIC annual conference is an important arena for dissemination and networking. The conference has invited several top international researchers and mathematics lecturer. It has therefor been important to bring new impulses to the Norwegian community. MatRIC wants the annual conference to be a physical meeting point. In 2022 the MatRIC annual conference will be 1st-2nd June at Hotel Norge in Kristiansand.

Open lecture

The goal of the open lecture is to present a popular and accessible image of mathematics. such that the students will be motivated to engage with mathematics. In 2022 MatRIC wants to invite our students to a new physical open lecture.

Merit award scheme.

MatRIC has been important in the development of the merit award scheme at UiA. MatRIC will continue to work together with UiA PULS to improve the merit scheme. MatRIC will take the initiative to start a pedagogical academy for faculty at UiA. The pedagogical academy shall be a meeting place across disciplines at UiA, for faculty who wants do improve teaching and learning.

MatRIC research and development grants.

MatRIC will make a new call for small research and development grants. These grants shall be open to all mathematics educators working in Norwegian institutions of higher education.

MatRIC contact group.

In 2018 MatRIC initiated the MatRIC Contact Group. There are about 20 members of the Contact Group with representatives from each of the major Norwegian higher education institutions campuses. The contact group will be invited to the MatRIC annual conference.

Drop-in and student engagement.

The Drop-in centers are important. MatRIC will continue to develop these centers to be important meeting points and learning arenas for the students. The drop-in centers will continue to focus on human connection competences. During 2022 MatRIC will move to the new location at Campus Kristiansand. At Drop-in Kristiansand MatRIC will employ learning assistants from the teacher educator program. The goal is to engage more students from the teacher education.

MatRIC will continue to work with FYSE and the other student mentor programs at UiA. The Learning assistant camp together with UiA PULS. MatRIC will also continue to employ student mentors, which acts as an important link between the student body and the MatRIC management.

Attachments

1. Personnel

Thomas Gjesteland	Director
Lillian Egeland saa	Project Manager
Simon Goodchild	Research
Yuriy Rogovchenko	Mathematical modeling, Leader of Erasmus+ project PLATINUM
Linda G. Opheim	Mathematics Teacher Education (coordinator)
Svitlana Rogovchenko	Drop-in Leader (Grimstad)
Elna Svege	Drop-in Leader (Kristiansand)
Hans Kristian Nilsen	Researcher
Kirsten Bjørkestøl	Researcher
Yusuf Feyisara Zakariya	Post Doc.
Ida Landgårds	PhD fellow /Mathematics for economics
Mahboubeh Nedaei	PhD fellow
Siri Ovedal-Hakestad	PhD fellow
Per Henrik Hogstad	Simulation, visualization, programming (Emeritus)
Preben Forsland	MatRIC studentmentor, Grimstad
Martin Nordskog	MatRIC studentmentor, Kristiansand
Eirik Matias Vinje	Student board member, Grimstad
Ida Monsen	Student board member, Kristiansand

Administrative support

Elisabeth Rasmussen	Conferences and events
Ling Jiang	Travel, accommodation, contracts
Bendik Dyrli	ICT/MatRIC Server technical support

Drop-in Grimstad

Even Vehus
Ida Zarei Johansen
Nithlen Ratnarajah
Rolkana Alo
Preben Forsland
Teklemariam Weldehawarit
Adrian Langvik
Benjamin Ims

Ane Sofie Andersen
Silje Hatlevik

Drop-in Kristiansand

Julie Kogstad
Marjan Daliri
Martin Nordskog
Oskar Solberg
Elisabeth Træland
Birgitte Andersen
Hallvard Foss
Rolf Nossun

2. Budget Commentary

Accounts and Budget submitted separately.

MatRIC receives 4 mill. NOK from KD distributed by DIKU. An additional 4 mill. NOK is received from the University of Agder (3 mill. From central allocation and 1 mill. From the Faculty of Engineering and Sciences). Three PhD fellowships devolved by UiA are additional to this cash income.

Due to the pandemic, MatRIC cancelled several dissemination activities, such as the annual conference, in 2021. Several workshop and seminar switch to digital platforms This has influenced the dissemination coast. MatRIC budget included a 100% position in mathematics for engineering. This position was not filled until January 2022. Also, the new PhD position started in September and not in January as in the budget.

3. Publications

Journal articles, books, chapters & published proceedings

- Balyk, Nadiia; Vasylenko, Yaroslav; Grod, I.; Oleksiuk, Vasyl; Rogovchenko, Yuriy. Project-based learning in a computer modelling course. *Journal of Physics: Conference Series (JPCS)* 2021
- Bas-Ader, S., Erbas, A.K., Cetinkaya, B., Alacaci, C. & Cakiroglu, E. (2021). Secondary mathematics teachers' noticing of students' mathematical thinking through modeling-based teacher investigations. *Mathematics Education Research Journal*, <https://doi.org/10.1007/s13394-021-00389-4>

- Thomas Gjesteland, Vegard Lima, Sverre Lunøe-Nielsen, Farzad Radmehr, Simon Goodchild
Gruppebasert prosjektoppgave i matematikk: Veiledernes erfaringer *Nordic Journal of STEM Education*, 5(1). [Proceedings from the MNT Conference 2021, University of Agder, Grimstad, Norway, March 15–16, 2021.]
- Goodchild, Simon; Bjørkestøl, Kirsten; Borge, Inger Christin; Nilsen, Hans Kristian; Tonheim, Odd Helge Mjøllem (2021). Educating to inspire active learning approaches in mathematics in Norwegian universities. *Nordic Journal of STEM Education*. ISSN: 2535-4574. 5 (1). doi:10.5324/njsteme.v5i1.3972.
- Gómez-Chacón, Inés M.; Hochmuth, Reinhard; Rogovchenko, Svitlana; Brouwer, Nataša. Methods and Materials for Professional Development of Lecturers. I: *Inquiry in University Mathematics Teaching and Learning. The Platinum Project. Nakladatelství Masarykovy univerzity 2021* ISBN 978-80-210-9983-8. s. 127-146
- Niclas Larson, Kerstin Larsson, Differences in Norwegian and Swedish student teachers' explanations of solutions of linear equations
- Larson, N., & Larsson, K. (2021). Differences in Norwegian and Swedish student teachers' explanations of solutions of linear equations. *Nordic Journal of STEM Education*, 5(1). [Proceedings from the MNT Conference 2021, University of Agder, Grimstad, Norway, March 15–16, 2021.]
- Radmehr, Farzad; Goodchild, Simon (2022). Switching to Fully Online Teaching and Learning of Mathematics: The Case of Norwegian Mathematics Lecturers and University Students During the Covid-19 Pandemic. *International Journal of Research in Undergraduate Mathematics Education*. ISSN: 2198-9745. doi:10.1007/s40753-021-00162-9.
- Rogovchenko, Svitlana. Mathematical Modelling Problems in a Mathematics Course for Engineers: A Commognitive Perspective. I: *Mathematical modelling education in East and West. Springer 2021* ISBN 9783030669959. s. 561-570
- Rogovchenko, Svitlana; Rogovchenko, Yuriy. Teaching Students to Think Mathematically Through Inquiry: The Norwegian Experience. I: *Inquiry in University Mathematics Teaching and Learning. The Platinum Project. Nakladatelství Masarykovy univerzity 2021* ISBN 978-80-210-9983-8. s. 197-213
- Rogovchenko, Yuriy. Mathematical Modelling with Biology Undergraduates: Balancing Task Difficulty and Level of Support. I: *Mathematical modelling education in East and West. Springer 2021* ISBN 9783030669959. s. 571-582
- Rogovchenko, Yuriy; Astafieva, Mariia; Hernandez Martinez, Paul; Lytvyn, Oksana; Morze, Nataliia; Pátíková, Zuzana; Rebenda, Josef; Rogovchenko, Svitlana. Mathematical Modelling and Inquiry-Based Mathematics Education. I: *Inquiry in University Mathematics Teaching and Learning. The Platinum Project. Nakladatelství Masarykovy univerzity 2021* ISBN 978-80-210-9983-8. s. 147-170
- Rogovchenko, Yuriy; Rebenda, Josef. Origins and Implementation of the Project. I: *Inquiry in University Mathematics Teaching and Learning. The Platinum Project. Nakladatelství Masarykovy univerzity 2021* ISBN 978-80-210-9983-8. s. 73-92
- Tranberg, Anders; Lurås, Inger Johanne; Jakobsen, Mette Mo; Siqveland, Arvid; Gjesteland, Thomas (2021). New Guidelines for the National Curriculum Regulations for Engineering Education in Norway (with emphasis on Mathematics). *Nordic Journal of STEM Education*, 5(1). [Proceedings from the MNT Conference 2021, University of Agder, Grimstad, Norway, March 15–16, 2021.]

- Zakariya, Yusuf F.; Nilsen, Hans Kristian; Bjørkestøl, Kirsten; Goodchild, Simon (2021). Analysis of relationships between prior knowledge, approaches to learning, and mathematics performance among engineering students. *International Journal of Mathematical Education in Science and Technology*. ISSN: 0020-739X. doi:10.1080/0020739X.2021.1984596.
- Zakariya, Yusuf F. (2021). Self-efficacy between previous and current mathematics performance of undergraduate students: an instrumental variable approach to exposing a causal relationship. *Frontiers in Psychology*. ISSN: 1664-1078. 11s 1 - 11. doi:[10.3389/fpsyg.2020.556607](https://doi.org/10.3389/fpsyg.2020.556607).
- Zakariya, Yusuf F. (2021). Variations of engineering students' attitude towards mathematics across gender and age: A MIMIC model approach. The proceeding of 20th SEFI Special Interest Group in Mathematics - SIG in Mathematics conference. ISBN: 9782873520229. *Société européenne pour la formation des ingénieurs (SEFI)*. Conference paper. s 51 - 56.