



MatRIC Centre for Research, Innovation and Coordination of Mathematics Teaching

Annual Report for 2020

Introduction

In a year of dramatic changes in how we teach, due to Covid-19, MatRIC has been more important than ever. The need for collaboration within the Norwegian higher education (HE) mathematics teaching community has been appreciated to an even greater extent than previously. MatRIC has been well-placed to take a crucial and leading role in facilitating the desired collaboration and networking.

During 2020 MatRIC has confirmed its position as the national meeting point for mathematics teachers in Norwegian HE institutions. This is shown by the very well attended webinars on teaching in the Covid-19 situations as well as the survey on teaching approaches, which MatRIC has led together with the Norwegian Mathematics Council. During the previous six years, the MatRIC annual conference and the MatRIC campus contact group have gathered Norwegian HE mathematics teachers. MatRIC is now in the position that we can set an agenda and take leadership in the development of mathematics teaching. MatRIC has finished the 3rd cohort of mathematics induction course with 19 participants, and the new course for lectures in teacher educators is now ready to start.

Within UiA MatRIC continues to change the teaching culture. The Drop-in mathematics support center at both Campuses (Kristiansand and Grimstad) continues to be a meeting point for students. In 2020 the Drop-in has also become digital. The learning assistant training program, that MatRIC has developed together with the center for teaching and learning (UiA PULS), has emerged as a sustainable program for the whole university. In mathematics for students joining the economics program, we see a lasting cultural change. Students show up on the voluntary pre-course to learn and we experience that students claim that mathematics is an important and useful subject.

Internationally MatRIC is still leading development in the European community through the Erasmus+ project PLATINUM. MatRIC has a strong collaboration with the German center for excellent in mathematics education- khdm through the teaching induction course. MatRIC is present at the major international conferences on higher education mathematics teaching, and MatRIC research is published in international journals.

A major achievement in 2020 is that MatRIC's first PhD fellows defended their theses. Helge Fredriksen and Shaista Kanwal have both contributed to students' engagement through their research on teaching methods such as flipped classroom and blended learning approaches.

In July in 2020 MatRIC changed leadership. Simon Goodchild, who had been the director of MatRIC since the beginning, turned 70 years. Thomas Gjesteland became the new director. During the previous two years, Thomas Gjesteland had been co-director of MatRIC. The combined leadership and the close collaboration between Director and Co-director during the previous two years ensured a smooth transition of leadership. Simon Goodchild is now taking an active supportive role in the MatRIC team and he is a close advisor for the MatRIC leadership.

1. Results compared to the application and centre plan

MatRIC is a dynamic center which integrate actions and dissemination. All MatRIC's actions have dissemination as a central element. For example, Drop In, Teaching induction course and Learning assistant program, which are reported in detail below, include both action and dissemination. All the actions that MatRIC undertakes are targeted towards achieving MatRIC's vision:

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

As described in MatRIC's action plan this vision is addressed in three focus areas: (1) Transforming students' learning experiences, (2) Transforming mathematics teaching and (3) Research and development-based mathematics education.

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 themselves 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

Student engagement is important within MatRIC, and MatRIC has a strong focus on peer-to-peer learning among students. Since 2017 MatRIC has organized a training camp for learning assistants in mathematics related subjects. We have experienced that the camp strengthens the students' competence and self-confidence in the role as learning assistants. This leads to better learning environment for our students. Since the inception of the program, MatRIC has collaborated with UiA's Centre for Teaching and Learning, UiA PULS to develop the Learning Assistants Program (LAP). LAP comprises three gatherings for the students. The first occurs at the beginning of the autumn semester, the second is in the middle and the last is after the semester ends. The topics addressed in LAP are: 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 (MatRIC for the mathematics LAs). LAP is now established as a sustainable program which embraces the whole university.

This year 61 participants met at Skottevik holiday centre on 6 - 7 August. In addition to the 61 learning assistants in mathematics related subjects, LAP has 26 learning assistants from 9 departments at UiA. The second gathering was held on the 3. November at campus Kristiansand and 4. November at Campus Grimstad. The final session was organized as a digital meeting in January. This program has been an important part of MatRICs dissemination within and across the University of Agder.

MatRIC Drop-in

MatRIC Drop-in support centers at Campus Kristiansand and Campus Grimstad have been a key action directed to students' learning. If one should ask a student on the UiA Campus to say what MatRIC is, the student will probably answer "Drop-in". For our students, MatRIC is synonymous with Drop-in. We clearly see that the Drop-in center is an action towards better learning experiences, but it is also a key point of dissemination to students at UiA. The Drop-in support centre at Campus Kristiansand is led by Elna Svege and the Drop-in support centre at Campus Grimstad is led by Svitlana Rogovchenko. At both campuses the Drop-in centers have been open 20 hours per week. Here students can drop in and discuss challenges they have in mathematics with an experienced mathematics teacher or advanced student/research fellow. The Drop-in center in Grimstad has been staffed with senior students who have participated in the learning assistant program. In Kristianstad the Drop in has been staffed with a combination of senior students and faculty from the departments of mathematical sciences.

After the lock down hit the university in March 2020, we received a grateful e-mail from a student saying: «I am studying a bachelor's degree in mathematics, and I depend on MatRIC drop-in to complete my studies». As a response to the lock down the Drop -in transformed into a digital platform by the second week. For the rest of the spring semester Drop-in support continued to be available through digital/online communication. During the fall semester of 2020 Drop in could again be physical present at both Campuses. However, some students could not come to campus since they were at risk due to Covid 19. The Drop In therefor developed a new digital platform where students can raise questions to tutors anonymously. Here is the link to the digital Drop-in: <https://www.uia.no/senter-og-nettverk/matric/drop-in>. (The digital Drop-in is a service for UiA students and funded from the contribution provided by UiA. We have received requests from students at other universities to be able to access the support, but unfortunately MatRIC has insufficient resources to make this a national service, although we would be delighted if we had the resource to make it possible).

Mathematics for students joining the Economics program

We see a lasting cultural change in the mathematics for economics program for students who will enter the School of Business and Law. Since 2017 MatRIC has organized a pre-course in mathematics for the students that enter the economics program. This course has been developed by the MatRIC PhD-fellow Ida Landgårds. The pre-course gives no study points, and it is voluntarily for the students to participate. In 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 participated in modules of the pre-course. In the fall of 2020 up to 130 students followed the pre-course in mathematics. In a survey 98% of the students reported that they will recommend the pre-course to others. This illustrates that the students see the value of increasing their mathematics skills before they enter the mandatory mathematics course. We also see that the student finds the pre-course very useful.

In the spring semester of 2020, the mathematics class for economics had 249 students. Only 4 of the students failed the mathematics exam. This is a substantial decrease in student failure rate that has been sustained since the pre-course was introduced, previously failure in the mathematics exam could reach up to 40 % of the cohort. In 2020 it was necessary to change the teacher of both pre-course and the regular mathematics for economics course. The improvement in performance was maintained, we are confident of a sustained cultural change that influences the whole program and that the improved performance is not only a result of an enthusiastic teacher. We believe that the extra time the students spend on mathematics is the reason for the improved results. A report, showing that there is a positive participation effect on the pre-course on the examination score, and hence, arguably, increased inclusivity of all students, is submitted to MNT-konferansen in 2021.

MatRIC has also supported the development of a new statistics course for the department of mathematics. This course will include some of the mathematics behind artificial intelligence and be targeted also towards students from the School of Business and Law. One of the goals is to attract the best students from the economics program, where we have seen an increase in the student performance recent years. This year 11 students from the School of Business and Law attended the more advanced statistics course. The focus on the pre-course, the mandatory course, and the more advanced mathematics course increases the learning outcome in mathematics for students in the School of Business ad Law. This is aligned with MatRICs vision.

Mathematics for engineering

One of the actions for increased attention in 2020 was to improve the mathematics learning for engineering students. MatRICs PhD fellow Yusuf Zakariya has researched the first-year mathematics course for engineering students. One of the main findings in his work is that students with high sense of perceived self-efficacy have a stronger tendency to induce a deep approach to learning mathematics. Zakariya suggests including more project work to increase the students perceived self-efficacy. Based on this result, and on other studies from our international network, e.g., Michael Grove, MatRIC and the Department of Engineering initiated 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 was developed in collaboration with the mathematics teachers and the teachers in the engineering programs. In this project 483 students were divided into 70 groups. The groups were supervised by 20 faculty members from the engineering programs. The supervisors found that the project acts as an important link between mathematics and the engineering subjects. However, the supervision was demanding and time consuming. A report on this project is submitted to the MNT-konferansen.

MatRIC has also initiated a 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. The FYSE coaches are senior students who contacts the new students and organize study groups. The focus is improving new students' well-being and learning environment on campus. Since the mathematics in the first semester is one of the biggest challenges for new students in the engineering program, MatRIC supported FYSE with 35 hours per week in math support. These hours were used in the FYSE study group to give extra mathematics support.

These actions described above shows some examples of how MatRIC is transforming students' learning experiences in mathematics. In the focus area of research (Primary Objective 3) this report also presents MatRIC's first successful PhD fellows, Helge Fredriksen and Shaista Kanwal. Their studies have also contributed to student's engagement through their research on teaching methods such as flipped classrooms and blended learning.

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 teachers seeking recognition for teaching quality.

Developing Teaching

To transform mathematics teaching MatRIC has continued to offer the innovative course for mathematics lectures. The MatRIC's Teaching Induction Course for (HE) Mathematics Teachers has recently concluded work with the 3rd cohort. This time the course has been organized together with the German German Centre for Higher Mathematics Education, Kompetenzzentrums Hochschuldidaktik Mathematik (khdm). This cohort started the course in September 2019 with 19 participants, ten from Norway (UiT, NTNU, HVL, UiS and UiA) and 9 from Germany. The sessions in 2020 became online due to the Covid 19 situation. This was a positive experience, and all participants joined the eight zoom sessions with Professor Chris Rasmussen (San Diego State University), Professor Burkhard Alpers (Aalen University), Dr Michael Grove (Birmingham University, UK) and Professor Chris Sangwin (Edinburgh University) spread over the spring and fall. The course leaders have been the course leaders Frode Rønning, Reinhard Hochmuth (khdm) and Simon Goodchild.

This course is important for dissemination of good teaching practice from world leading HE mathematics teachers to the Norwegian community. This course has also led to personal connections between 10 mathematics teachers at 5 HE institutions in Norway and with 9 German teachers.

Course for mathematics teacher educators

Norwegian Centre for Mathematics Education (NSMO) at NTNU and MatRIC have developed a 30-study points course for faculty working in mathematics teacher education. In this course we have engaged as contributors, several of the world's leading researchers in the field of mathematics teacher education. Among them are Professor Merrilyn Goos, National Centre for STEM Education, Limerick University, Ireland,

Professor Elham Kazemi, University of Washington, Professor Peter Liljedahl, Simon Fraser University, and Professor Emeritus John Mason, Open University and University of Oxford. This course is open for faculty at Norwegian higher education institutions, who are working in teacher education. The course will emphasize on both teachers' teaching knowledge and their teaching practices. In this course, the mathematics teacher educators will participate in a learning community, and they get to explore teaching practices that engage initial teacher education students and that will support the latter in their development as future mathematics teachers.

PLATINUM (An Erasmus+ project)

PLATINUM's consortium is established by University of Agder (coordinator) connecting 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. As part of the PLATINUM/MatRIC collaboration there was a workshop on inquiry-based teaching aimed especially at Mathematics teachers working within UiA. The workshop was held at the Grimstad campus on February 13. Barbara Jaworski and Simon Goodchild were the main presenters at the workshop. There were 15 participants from both campuses and three departments within the Faculty of Engineering and Science.

Due to travel restrictions and other anti-Covid measures taken across Europe that varied across the different partner countries, Transnational Project Management Meetings in Hannover (May 2020) and Kyiv (September 2020) could not take place. The former was replaced by a two-day "virtual Hannover" meeting which was held online in May. Although we run regular biweekly Management/Leadership meetings, this was the very first experience of a large format virtual meeting for the PLATINUM consortium. Overall, it worked reasonably well, and we gained some useful experience. Since the situation with Covid in Spain in summer was very bad, the regular international conference in Madrid in June was cancelled and thus, also, PLATINUM Multiplier Event planned as a satellite to this conference did not take place. It has been postponed to summer 2021. The autumn 2020 became a very busy period due to our ambitious plans regarding the publication of a "PLATINUM book" which should summarize much of the project's experiences and provide an overview of the project's six intellectual outputs and reports from the eight local communities of inquiry.

Both courses described above, and the PLATINUM project are important actions taken to transform mathematics teaching. They also serve a dissemination function since we facilitate exchange of experience, expertise, and good practice between mathematics teachers within Norwegian higher education institutions and connect these with international experts.

The 2020 annual conference was cancelled due to Covid 19. The annual conference has been an important action to disseminate developments in mathematics teaching for the Norwegian community. Instead, we organized webinars on teaching in the Covid 19 situation. These webinars will be described below under dissemination. When the lock down occurred MatRIC provided digital teaching tools to Mathematics teachers at UiA. Several of our teachers learned how to use iPads to communicate to students through Zoom. The experience was presented in the MatRIC webinar on digital teaching.

MatRIC has over the six years developed simulations in mathematics and other STEM subjects through the SimReal project. SimReal is linked to from Naturfagsenteret and from the pre-course for engineering textbooks in physics and mathematics at Cappelen Damm.

Primary Objective 3: Research and development-based mathematics education

During 2020 two of MatRICs PhD fellows defended their theses. On Tuesday 25 May 2020 Helge Ingvart Fredriksen defended his thesis: *An exploration of teaching and learning activities in mathematics flipped*

classrooms: A case study in an engineering program. Dr Fredriksen was supervised by Professor Said Hadjerrouit, UiA, Professor Ragnhild Johanne Rensaa, UiT and Professor John Monaghan, UiA.

Dr. Fredriksen studied flipped classroom approaches in the teaching of mathematics at the university level. The thesis does not provide definite answers on the question about flipped classroom approach being “better” than traditional teaching in higher education contexts. However, there were clear signs that most students experienced a higher degree of motivation through the social learning community facilitated by the flipped classroom approach. Additionally, the video-preparation was considered an important means to achieve a more interesting and varied learning experience. Also, the students found the instructor more available for support and guidance than in the traditional lecture-based teaching.

Shaista Kanwal defended her thesis *Dynamics of engineering students’ online learning activities* on Thursday 2 November 2020. Dr. Kanwal has been supervised by Professor Martin Carlsen, UiA and Professor Frode Rønning, NTNU. Dr. Kanwal has analyzed mathematical activity of 4 undergraduate engineering students in an online and in a blended learning environment over two consecutive semesters. In the online environment, students had a wide variety of online and digital tools available which offered them a huge number of action possibilities. The action possibilities offered by these tools were spread across both ends of spectrum with regards to the quality of students’ engagement with mathematics. In some cases, tools facilitated in exploring mathematical properties that led them to engage with the involved mathematics in effective ways. In other cases, the tools provided the solutions of the tasks without having the students to engage with mathematics involved and thus the mathematics remained invisible for the students.

PhD seminar

UiA’s priority research center MERGA (Mathematics Education Research Group at Agder) and MatRIC organized a PhD seminar on 22 October focusing on how to get research published. The speakers at the seminar were Morten Blomhøj, Roger Säljö’s and David Reid. The seminar had 17 PhD-fellows from UiA, NTNU, UiT and UiS participating. This seminar is important for dissemination to the national network on research in mathematics education.

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. 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. This work has been presented at the Norwegian Mathematics Council annual meeting and it is submitted to the MNT-konferansen in March 2021. With this survey MatRIC and the Norwegian Mathematics Council focuses the national agenda for mathematics teaching in Norway.

MatRIC Survey of online mathematics teaching and learning spring semester 2020

After the lock down during the spring semester in 2020, 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. 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

MatRIC continues delivered research and development in mathematics education during 2020. MatRIC has contributed on 35 international papers. MatRIC has recruited a new PhD fellow who will use bio-sensing technology to study mathematics learning. The fellow will start in February 2021 (travel and Covid-19 restrictions permitting).

2. Dissemination of knowledge and practices.

Within MatRICs 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. In this section we will highlight some of our other dissemination activities.

Dissemination within UiA

One of MatRICs goal for 2020 was to develop more effective ways of reaching the student body. We want students to make better use of the mathematics learning support available, and we want students to be more active in the development of MatRIC. In March 2020 MatRIC employed two student mentors to strengthen the link between students and the leadership of MatRIC. Karoline Kongshavn is MatRIC student mentor at campus Kristiansand and Preben Forsland is the MatRIC student mentor at campus Grimstad. MatRIC has also initiated a forum called the MatRIC forum, where the MatRIC team, student mentors and student board members meet on a bi-weekly basis. These meetings, where four students are present, have given the MatRIC leadership valuable input and connection to the student body. These mentors, together with the MatRIC 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.

The Learning Assistant Program, Drop In and the collaboration with FYSE, which are described in the section above, are all important for dissemination within UiA. For these actions the dissemination focus has been on the students. The PLATINUM-workshop at UiA gathered 15 participants from both campuses and three departments within the Faculty of Engineering and Science. Here the focus of dissemination is our colleagues. In the new project in first year mathematics for the engineering students we included 20 teachers as supervisors. This was also an important way of disseminating transformation of mathematics teaching to our colleagues. MatRIC also uses the UiA news page actively to disseminate to the whole university. See e.g.

<https://www.uia.no/en/news/mathematics-teaching-and-support-centre-moved-online>

<https://www.uia.no/en/news/61-students-become-teaching-assistants>

<https://www.uia.no/nyheter/lanserer-ny-nettstad-for-matematikkhjelp>

Dissemination outside UiA

In the introduction of this report, we stated that MatRIC is the national meeting point for mathematics teachers in Norwegian HE institutions. Within these institutions we share the goal of improving mathematics teaching and learning. MatRIC has the resources to transform intentions into actions that results in improvements in students learning experience in mathematics. MatRIC aims to use the available resources for the benefit of the national community of students and teachers of mathematics.

The MatRIC Campus contact group is the key point of contact for dissemination within Norwegian HE institutions. The (new) MatRIC Director and Project Manager had planned to visit most of the campuses during 2020. This was not possible due to the pandemic. Instead, The MatRIC director and administrative leader visited many of these contacts digitally. These digital meeting between the MatRIC management and the Campus contacts have been an effective way to maintain these contacts.

After the spring semester of 2020 MatRIC invited the Norwegian community to a webinar on experience with digital teaching in collaboration with the Norwegian mathematics consul. At this seminar Farzad Radmehr and Simon Goodchild presented the preliminary report on the survey on digital teaching. Tom Lindstrøm, UiO, presented the experience on behalf of the mathematics teachers at UiO. Tor Kristian Grandalen, UiA, presented the experience with digital Drop -In and Torstein Kastberg Nilssen, UiA, presented the experience with using iPad as a writing tool in mathematics teaching and how he organized digital office hours. More than 80 mathematics teachers participated on this seminar and the following discussion session.

<https://www.uia.no/arrangementer/digitalt-seminar-om-digital-matematikk-undervisning>

In January 2021 we organized a similar webinar on digital assessment. This webinar had 130 participants. We experience that the MatRIC campus contact group is an important and effective channel for dissemination to mathematics teacher in Norwegian higher education institutions.

MatRIC has also disseminated our work through the subject groups of Universities Norway (UHR) for Mathematics Science and Technology (MNT), and for Economics and Administration (ØA). MatRIC has led the work on new guidelines for the National Curriculum Regulations for Engineering Education. The guidelines were approved by UHR-MNT on 25. November 2020. MatRIC has contributed with several presentation and debates at UHR-MNT and the Norwegian Mathematical Council in this process. In the work with new guidelines MatRIC has brought in internationally expertise, such as Burkhard Alpers, as advisor. The work on guidelines is targeted towards MatRICs vision of improving students learning experience in mathematics.

Both the Teaching induction course and the course for Mathematics Teacher Educators, which have been described above, are both important for dissemination. With these courses MatRIC brings together Norwegian teachers and brings them in contact with world leading researchers in higher education mathematics teaching.

Conferences

The Annual MatRIC conference has been an important arena for dissemination. In the previous six years MatRIC has brought together the Norwegian community and leading international experts. This year the annual conference was cancelled due to Covid 19. Instead, the webinars, mentioned above, have acted as a meeting point. The solid groundwork from the previously six years has been important in the transition from physical meeting to webinar. We do believe that physical meeting will be important in the future. However, the pandemic has taught us that online webinar can be a very effective way of dissemination. We experience that we reach more participants on webinar. We assume this is due to more efficient use of time.

MatRIC will host the 20th SEFI (European Society for Engineering Education) Special Interest Group in Mathematics - SIG in Mathematics Seminar on Mathematics in Engineering Education. This conference will bring together approximately 70-100 European mathematics teachers with the focus of mathematics teaching in engineering. The conference was originally planned for June 2020, but it was postponed to 2021 due to Covid 19. It is now decided that the conference will be held digitally.

<https://sefimwg2020.sciencesconf.org>

MatRIC will together with Universities Norway and Realfagsenteret host the MNT-conference (STEM-conference) 15.-16. March 2021. This conference brings together teachers and leaders in Norwegian STEM departments. This is the most important Norwegian conference in STEM education, and it is organized on a bi-annual basis. The proceedings will be published in Nordic Journal of STEM Education.

<https://realfagsrekruttering.no/konferanser/mnt-konferansen-2021#om-konferansen>

MatRIC is present at the most important international conferences in the field of research in undergraduate mathematics education. During 2020 MatRIC was present at the Research in Undergraduate Mathematics Education (RUME) conference in Boston, USA and the International Network for Didactics Research in University Mathematics (INDRUM) conference (online due to the Covid-19 restrictions). Several international conferences were postponed due to the pandemic. MatRIC team members had submitted abstracts to The Nordic Research in Mathematics Education (NORMA) conference in Oslo, the European Society for Engineering Education-Mathematics Working Group (SEFI-MWG) conference in Kristiansand, the International Congress of Mathematics Education (ICME) in Shanghai and the International Group for the Psychology of Mathematics Education (PME) conference in Thailand, but they were all canceled or postponed.

3. Further progress

The main activities in MatRIC were not influenced by the pandemic in 2020. As described above, the actions at UiA have been implemented according to the action plan, and most of the actions nationally and internationally have been implemented as planned. Several activities, such as the teaching induction course and visit to the Campus Contacts, were planned physically but moved to digital platforms. The main change in 2020 was the cancellation of the annual conference and the postponed SEFI-MWG conference. Also, several international conferences where MatRIC research was to be presented, were also cancelled or postponed. MatRIC will continue to work according to the action plan in 2021 with focus on the following:

Conferences

In 2020 the annual conference and the SEFI-MWG conference were cancelled due to Covid 19. The physical meeting points have been important in MatRIC dissemination strategy and MatRIC will plan for a physical annual conference in 2021. MatRIC will also organize the MNT-konferansen and the SEFI-MWG conference on digital platforms. MatRIC has seen the value for digital meeting points, and we plan to organize several webinar on teaching and learning of mathematics during 2021.

Digital assessment

Niclas Larson joins the MatRIC team from January 2021. He will focus on digital assessment and further strengthen MatRIC's work in this area. MatRIC has also announced a PhD-position, which will focus on digital assessment in mathematics.

Mathematics for engineering

MatRIC will continue to work on the mathematics for engineering. The goal is to strengthen the bridge between mathematics and the other engineering subjects and disseminate some of the lessons we have learned from the mathematics for economics program. MatRIC will announce a new full-time position for three years. This new person will join the mathematics teachers' team in Campus Grimstad and give room for more teacher to further develop the project we initiated in first year mathematics for engineering students.

Drop in and student engagement

The Drop in centers are important and MatRIC will continue to develop these centers to be both physical and digital meeting points for students. MatRIC will continue to work with FYSE in 2021, and further develop the Learning assistant camp together with UiA PULS. MatRIC will also continue with student mentors, which acts as an important link between the student body and the MatRIC team

Teaching courses

In 2021 MatRIC will start the Course for Mathematics Teacher Educators. The course, described above, is now recruiting participants from Norwegian institutions. The 3rd cohort of Mathematics Teaching induction Course finished in 2020. MatRIC will continue to develop this course during 2021 together with UiA PULS. MatRIC wants to develop modules in mathematics teaching that can fit into the basis course in university pedagogy at UiA and other Norwegian institutions. The teaching induction course should also be aligned with the merit award scheme. MatRIC wants to be a ladder for our colleagues to develop their educational profile.

Continuation strategy

MatRIC is now in the final 3 years as a centre for excellent in education. It is important for MatRIC to sustain the network and development that has occurred over these years. In April 2020 MatRIC invited the advisory board and the management board to a webinar discussing continuation strategy. This webinar gave important input and MatRIC will work on the continuation strategy in the remaining years.

Conclusion

MatRIC continues to work towards transformed and improved learning experience for students through the three focus areas of Transforming students learning experiences, Transforming mathematics teaching and research and development-based mathematics education. In the Covid 19 situation MatRIC has been able to follow the action plan. MatRIC has also been able to adjust to the new Covid 19 situation, and MatRIC has taken nationally leadership in teaching development during the pandemic.

Attachments

1. Personnel

Thomas Gjesteland	Director (From July 2020)
Simon Goodchild	Director (Until July 2020)
Lillian Egelandsoo	Project Manager
Yuriy Rogovchenko	Mathematical modelling, Leader of Erasmus+ project PLATINUM
Linda G. Opheim	Mathematics Teacher Education (coordinator)
Barbara Jaworski	Research Coordinator
Svitlana Rogovchenko	Drop-in Leader (Grimstad)
Elna Svege	Drop-in Leader (Kristiansand)
Hans Kristian Nilsen	Researcher (until August 2020)
Kirsten Bjørkestøl	Researcher
Torstein Kastberg Nilssen	Mathematics for economics
Farzad Radmehr	Post Doc. Research Fellow (until August 2020)
Ida Landgårds	PhD fellow /Mathematics for economics
Shaista Kanwal	PhD fellow (Successfully defended November 2020)
Helge Fredriksen	PhD fellow (Successfully defended May 2020)
Henrik Kjelsrud	PhD fellow
Floridona Tetaj	PhD fellow
Yusuf F Zakariya	PhD fellow
Per Henrik Hogstad	Simulation, visualization, programming (Emeritus)
Preben Forsland	MatRIC studentmentor, Grimstad
Karoline Kongshavn	MatRIC studentmentor, Kristiansand
Camilla Kaalstad	Student board member, Grimstad
Julie Kogstad	Student board member, Kristiansand

Administrative support

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

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 Science). Four PhD fellowships devolved by UiA are additional to this cash income. Due to Covid 19 MatRIC has spent less than budgeted on dissemination in 2020. This will be adjusted in the budget for 2021.

3. Publications

Journal articles, books, chapters & published proceedings

1. Amani, A., Alamolhodaei, H., Ghanbari, R. & Radmehr, F. (2020). An epidemiological model for predicting students' mathematics anxiety. *Journal of Interdisciplinary Mathematics*
<https://doi.org/10.1080/09720502.2020.1786938>
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