




CEMO

Centre for Educational Measurement

2021 ANNUAL REPORT

UNIVERSITY
OF OSLO

The background of the page is a photograph of a modern building. The building has a facade with large glass windows and panels in various colors like blue, green, and red. In the foreground, there is a glass railing with a metal mesh fence. The sky is visible in the upper right corner.

The Centre for Educational Measurement at the University of Oslo (CEMO) is a centre for basic and applied research in the field of educational measurement and assessment. Our goal is to generate the knowledge needed to solve the challenges related to measurement and assessment in education, and thus in the long run, to contribute to high educational quality in Norway and internationally.

CEMO is based at the Faculty of Educational Sciences and develops measurement and assessment competence in Norway and the Nordic countries by teaching Master and PhD students as well as practitioners, and by counselling stakeholders. The centre collaborates with similar units in many other countries and is part of a large international research network. This report provides a comprehensive overview of our achievements, ongoing projects, outreach, publications, and events over the past year.



CEMO 2021 in Brief

2021 was a year with great achievements at CEMO, despite the continued challenges caused by the Covid-19 pandemic.

The centre now includes more than 30 employees from 18 countries: five (associate) professors, five adjunct professors, four postdoctoral fellows, 15 PhD candidates, four administrators and several research assistants. In 2021, we welcomed a new study administrator and two new PhD candidates. Fortunately, we were also able to accept guest researchers for the first time since the onset of the pandemic. CEMO hosted three guest researchers in 2021.

A decision with outstanding long-term relevance was that the Faculty of Educational Sciences established CEMO as a permanent unit. The funding provided by the Ministry of Education and Research will be substituted by the faculty from 2023 on. As part of that decision, CEMO will have a new board with representatives from research environments at the faculty and from outside the university.

A huge research activity in 2021 was a Centre of Excellence application to the Research Council of Norway (RCN) in collaboration with the other units at the Faculty of Educational Sciences, two units at the Faculty of Social Sciences and the Public Health Institute. Our application "CREATE – Centre for Research on Equality in Education" was one of 36 (out of 161) applications invited to further develop their application. We wrote an extended proposal that will be evaluated by three independent experts, and there will be an interview with a panel of nine interdisciplinary experts in May 2022. The latter will make the final decision in early fall 2022.

PhD training is a core task of CEMO. Two of our PhD candidates successfully defended their doctoral theses in 2021, and for two other PhDs we arranged their mid-term assessments which are typically carried out halfway through the doctoral period.

With our many PhDs, we have a lively research environment with a number of academic and social activities.

CEMO team members (co-)authored 49 scientific articles in 2021. The majority were published in journals with high impact factor or on the highest quality level according to the Norwegian publication system. In 2021, we learned that Centre Director Sigrid Blömeke and Professor Ronny Scherer were again among the most productive researchers across all fields in Norway, as assessed by the number of publication points in the period of 2017-2020.

CEMO has one EU-funded project and three projects funded by the Research Council of Norway (RCN) from before. Three additional RCN applications were submitted in spring 2021. The centre is also involved in the evaluation of Fagfornyelsen, a large curriculum reform in Norway, along with the other three units at the Faculty of Educational Sciences.

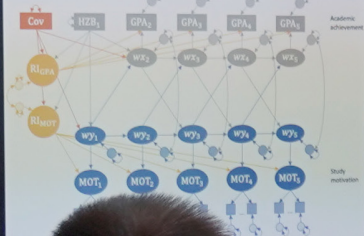
The largest single activity at CEMO is our Master of Science in Assessment, Measurement and Evaluation. All employees are actively involved in the program. A highlight is that two of our master's students were awarded student innovation grants from the Faculty of Educational Sciences. The second cohort graduated in spring 2021. Our graduates have been competitive on the job market. Some have started their PhDs, while others have pursued careers as data analysts at private companies or in the public sector.

In 2021, CEMO hosted two events: *Get to know CEMO – beyond the numbers* which was a digital event and the *October Gathering in Psychometrics* which was an on-site seminar in collaboration with the Norwegian Business School (BI) [in](#)

Random-Intercept Cross-Lagged Panel Models (cont'd)
Longitudinal associations between academic achievement and motivation

T_1 T_2 T_3 T_4 T_5 Time points

Model 3 (R-CLPM with H2B and other covariates predicting the random intercepts)



the measurement models of study motivation and among covariates and H2B are not shown



The Director's Comments

It is a great pleasure for me to look back at 2021. Despite the continued complications caused by the COVID-19 pandemic due to home office with digital teaching and meetings, we also saw many great activities and breakthroughs in 2021.

CEMO has already arrived at its ninth year of existence. Time is flying! A highlight of the year was that we could graduate the second cohort of our Master of Science in Assessment, Measurement and Evaluation program. It is enjoyable to see that many of our graduates stay in Norway which is in line with our ambition to strengthen national assessment expertise.

Another highlight was that PhD candidates Kondwani ("KJ") Kajera Mughogho and Melaku Tesfa Tesema successfully defended their theses in February and November respectively. Congratulations to both of you and all the best for your future! We are currently building up a "wall of fame" at CEMO where you will have a central place.

Seeing former CEMO team members succeeding and welcoming new team members to Oslo are enjoyable tasks. We were again lucky with recruitments in 2021. Tony Tan and Yuriko Sosa joined CEMO as PhD candidates, and Malene Jordal Aase joined us as the new study coordinator. Great to have all of you on board! I am much looking forward to collaborating with you.

In 2021, we had to say goodbye to two team members: Postdoctoral fellow Alexandra-Corina Niculescu accepted a job offer in Switzerland, and Professor II Andreas Frey stepped down in favor of his many duties in Germany. Thank you very much to both of you for all your work and contributions to our academic and social environment!

CEMO accomplishments have also been recognized by others. Master students Tony Tan and Jayeong Song received the Innovation award from the Faculty of Educational Sciences. Congratulations! This

is a great indicator of the quality of our Master program. PhD candidate Henrik Galligani Ræder received the University's Cultural and Social Activities award. Well-deserved and congratulations! Finally, I was elected to the Norwegian Academy of Science and Letters which I regard as a great honor.

We can also welcome members of the new CEMO board. The members were elected or appointed in the fall 2021 and start their work on January 1, 2022. It will be a great pleasure to discuss strategic CEMO matters with you: Janne von Koss Torkildsen (Chair, Department of Special Needs Education; substitute Henrik Daae Zachrisson), Guri Nortvedt (Department of Teacher Education and School Research, substitute Julius Kristjan Björnsson), Johan Braeken (CEMO, substitute Malene Jordal Aase), José Manuel Arencibia Aleman (CEMO, substitute Isa Steinmann), Amy Lorenz (student, substitute Sverre Berg Ofstad), and Roger André Federici (Norwegian Institute for Studies in Innovation, Research and Education, substitute Ulf Henning Olsson, Norwegian Business School).

When we write the CEMO 2022 report, we will know whether we succeeded with our Centre of Excellence application. We are 16 senior researchers and have spent almost three years on developing a high-quality proposal. Now it is not in our hands any longer – just waiting...

All the best for 2022!





Graphic Design & Photos: Shane Colvin
Illustration: Colourbox



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1. Research at CEMO

Research on measurement challenges with a focus on measurements used in the field of education is a primary task for CEMO, and team members working in this area specialize in statistics, psychometrics and latent variable modelling, the development of innovative assessment formats as well as linking and equating of data.

The application of such measurements to different areas of educational research is another primary task at CEMO, and team members working in this area focus on measuring socio-emotional and cognitive educational outcomes, analyzing data from international large-scale assessments or assessing student progress with objective structured clinical examinations (in collaboration with the Faculty of Medicine).

Research at CEMO is firmly established, visible in the high quality of our publications, success in the competition for external grants, and international recognition in terms of awards and board memberships. CEMO has developed a research portfolio around four strands: modern test design, statistical methods for innovative assessments, educational measurement in the Norwegian context, and international large-scale assessments.

Frontier Research in Educational Measurement (FREMO) research group

FREMO was established in 2018 to create an arena for cutting-edge research in educational measurement. Hosted by CEMO, the research group collaborates with other research groups at the Faculty of Educational Sciences and carries out advanced training of PhD candidates and Master students. FREMO includes CEMO's academic team members and is open to members from other departments at the faculty. Activities are organized by FREMO leader, Associate Professor Björn Andersson and supported by Postdoctoral fellow Chia-Wen Chen.

In addition to PhD training, FREMO activities can be divided into two areas: joint activities which involve all the members of FREMO and specialized activities which involve the members of a subgroup reflecting the four CEMO research strands described above. FREMO also provides financial support for, e.g., research assistants, language review services or administrative support.

The bi-weekly brown bag seminar is the most frequent activity of the research group, engaging all FREMO members. PhD candidates are expected to present their research at the seminar. CEMO postdoctoral fellows, professors and guest researchers also participate and present. In 2021, the seminar remained online and was open to the public via registration. This opportunity attracted several new participants in the audience.

A major task of FREMO is to organize the international conference FREMO which was hosted in Oslo for the first time in September 2018. We had planned to host the conference in September 2020 and then again in 2021 but had to cancel the conference due to the Covid-19 pandemic. FREMO instead hosted two other events in 2021: *Get to know CEMO – beyond the numbers* which was a digital event and *October Gathering in Psychometrics*

which was a physical gathering in collaboration with the Norwegian Business School (BI) based in Oslo. The main organizer of these events was CEMO Associate Professor Björn Andersson. Both events were successful and widely attended. More details about each event can be found here: <https://www.uv.uio.no/cemo/english/about/news-events-and-publications/events/2021/get-to-know-cemo.html> and here: <https://www.uv.uio.no/cemo/english/about/news-events-and-publications/events/2021/october-psychometrics.html>.

External Funding

CEMO researchers have received substantial external funding over the years. The centre currently holds four research grants: one from the European Commission and three from the The Research Council of Norway (RCN). In addition, several CEMO employees participate in externally funded projects internationally. The goal is that all permanent academic team members are involved in an externally funded project or an application under consideration at any time.

Outcomes and Casual Inference in International Comparative Assessments (OCCAM)

Marie Skłodowska-Curie Innovative Training network (EU Horizon 2020)

Rolf Vegar Olsen, Sigrid Blömeke, Jelena Veletic, Wangqiong Ye, and Isa Steinmann

OCCAM aims to educate the next generation of educational researchers. The funding has been used to employ and support 15 PhDs, employed at one of the partner institutions. All PhDs have extensive stays at another institution (six months) and participate in regular network meetings and workshops as part of their training. The PhDs investigate trends and differences in educational achievement, determinants and changes of these and the effects of educational policy from an international perspective using data from international large-scale assessments (ILSAs) in mathematics, reading, and science.

Educational assessments of the 21st century: Measuring and understanding students' adaptability in complex problem-solving situations (ADAPT21)

The Research Council of Norway (RCN)

Ronny Scherer and Alexandra Niculescu

The aim of the project is to understand the nature of adaptability. We are often faced with situations where the information needed to solve a problem is not immediately obvious and things change rapidly. The ability to cope with such situations is referred to as “adaptability”. The project focuses on how students adjust their thinking, behavior, and drive to changes and novelty in complex problem-solving situations. A computer-based test has been developed that captures the construct and its determinants. The data are used to examine the relation of adaptability to educationally relevant constructs, such as reasoning, academic self-concept, growth mindset, and beliefs about the nature of knowledge.

Latent Variable Factor Mixture models to track Longitudinal Differentiation Patterns

The Research Council of Norway (RCN)

Johan Braeken and Saskia Van Laar

This project aims to develop sound statistical procedures to accommodate the tracking of differentiating developmental patterns. Development is something that is typically aspired in education, for example in terms of student learning, or in clinical practice, for example in terms of patient improvement. Usually, the same measurement instrument is used and scores can be compared across time. However, in some situations you are unable to use the same instrument or you have to redefine what you are measuring, and qualitative changes would be a sign of development. In such situations, it is necessary to provide alternative ways to measure and model such development.

Embracing Heterogeneity in International Surveys: Optimal Test Design and Parameter Estimation

The Research Council of Norway (RCN)

Leslie Rutkowski, David Rutkowski, Kondwani Kajera Mughogho, and Yuan-Ling Linda Liaw (former CEMO Postdoctoral fellow)

In this project, the aim is to develop, integrate, and further refine several methods intended to improve the accuracy of achievement scores by incorporating (rather than ignoring) country or region-specific factors into the test design and estimates. Current methods assume that a single set of questions is universally suitable for dozens of highly varied participating countries. It is assumed that participants understand and answer questions in the same way regardless of their cultural background while departures from this assumption have important consequences for achievement results and rankings.

PhD candidates and Postdoctoral fellows at CEMO

Training the next generation of PhD candidates and Postdoctoral fellows is a core task of ensuring sustainable research in the field of educational measurement. These two groups are our most valuable resources when it comes to long-term effects of CEMO's research. PhD candidates and Postdoctoral fellows are typically employed for four years, including a 25% share of service work that mostly means teaching in our Master program. This time distribution contributes to developing the competence needed in future jobs both inside and outside academia.

CEMO's Deputy Director, Professor Rolf Vegar Olsen, is the PhD coordinator. He organizes the activities related to our PhDs and maintains the supervision guidelines which describe expectations and responsibilities for the PhDs and their supervisors. To support the career development of Postdoctoral fellows, CEMO has also selected a

Postdoctoral coordinator, Professor Ronny Scherer.

CEMO values gender diversity and aims for a balanced distribution at each level of the academic career ladder. We have so far succeeded with respect to PhD candidates and Postdoctoral

fellows, most of whom are women. However, this is reversed at the level of senior scientists. Thus, focused efforts at CEMO aim at promoting female Postdoctoral fellows to a level of scientific independence that will qualify them for permanent academic positions internationally.

CEMO PhD Defenses 2021



Kondwani Kajera Mughogho

Kondwani defended his thesis titled, *Subscale Score Estimation Methods in International Large-Scale Assessment. What is the subscale estimation method of Choice?* at the Faculty of Educational Sciences, University of Oslo, on 24 February 2021. The project was part of the Research Council of Norway funded project, “Embracing Heterogeneity in International Surveys”. In spite of a body of research into subscale score reporting at the individual level, there exists a paucity of research into subscale score estimation in international large-scale assessment (ILSA). His research aimed at evaluating the typically available methods for subscale score estimation in order to identify a model that was suitable for item parameter estimation, population score estimation, and reporting valuable subscale scores.



Melaku Tesfa Tesema

Melaku defended his thesis, *Inequalities in educational outcomes in Ethiopia: An exploration of gender and regional differences based on national examinations in grades 10 and 12* at the Faculty of Educational Sciences, University of Oslo, on 29 November 2021. His dissertation provided a thorough discussion of the results from three different empirical studies on inequalities in educational outcomes and equity policy in Ethiopia. Specifically, the studies focused on gender and regional disparities and on how policy measures and educational opportunity impact gender equity in school attainment, enrolment and access in Ethiopia.

Nordic network in Educational Measurement and Assessment

Although many similarities exist across the Nordic region in how each country thinks about and organizes education, there are clear differences in how issues related to measurement and assessment in education are approached. This provides a diverse range of policies affecting how assessments are conceptualized and practiced across the region. To address this, CEMO and their counterparts in the region established a network for Educational Measurement and Assessment as part of the Nordic Educational Research Association (NERA): <https://neranetwork1.wordpress.com>. Conveners are

Rolf Vegar Olsen, CEMO, Norway; Jeppe Bundsgaard, Aarhus University, Denmark; Mari-Pauliina Vainikainen, University of Tampere, Finland; Christina Wikström, Umeå University, Sweden. The purpose of the network is to create an arena for exchanging research ideas and planning research collaborations across countries. The network is open for research targeting innovative assessment formats, comparisons of assessments across the Nordic countries, use of assessment data for accountability and/or school development, issues of validity, fairness and equity in assessment, psychometric theory and practice, and similar themes.



2 Teaching at CEMO

CEMO offers courses for Master students and PhD candidates. We consider research and teaching to be mutually dependent on each other.

The Master of Science in Assessment, Measurement and Evaluation (MAE) program is our most important long-term contribution to serve societal needs. The program, led by Professor Johan Braeken and the administrative coordinators Malene Jordal Aase and Siri Heslien, provides specialized training in developing and administering measurement instruments, analyzing data, and reporting results from assessments, measurements or evaluations. This is the first and only program of its kind in the Nordic region. Due to the Covid-19 pandemic, some of the courses in the spring semester of 2021 were held digitally, while in autumn 2021 we were mostly back to in-person teaching.

The number of MAE applicants has stabilized since the program started in 2018. In 2021, we sharpened our admission criteria with respect to the knowledge of introductory quantitative research methods and statistics. This improved the qualification of students who have successfully taken on the courses in the program. In addition, the minimum English requirement for international programs at the University of Oslo has been raised. The number of qualified applicants has not dropped despite the new requirements.

The graduating cohort: 2019-2021

The second MAE cohort graduated in the spring of 2021 and has been competitive on the job market. One of the graduates has started his PhD at CEMO, while others have started positions as data analysts at private companies or in the public sector. Seeing that our students are competitive in the job market makes it clear that our program leads to great career opportunities. The projects our graduates have been working on as part of their Master thesis indicates their interests and qualifications. All Master theses can be accessed through the UiO library database by following the links published on our program pages: <https://www.uio.no/english/studies/programmes/assessment-evaluation-master/thesis-projects.html>

SPRING 2021:

Haram, Henrik Hung: *Shortening the Test? A Comparison of Test Shortening Strategies.* Supervised by Professor Johan Braeken.

Kharlamov, Aleksei: *Do Growth and Fixed Mindsets Go Together? Meta-Analysis.* Supervised by Professor Ronny Scherer and PhD candidate Diego Campos Gonzalez.

Park, Sohl Bin: *Validating a Mindset Scale.* Supervised by Professor Ronny Scherer and Sissel Naustad (MadeToGrow).

Ruiz, Jesus Daniel Sanchez: *Age and Innovativeness: Effects of Teachers' Age on Perception of School Innovativeness.* Supervised by Professor Sigrid Blömeke, Professor Ronny Scherer and Dr. Trude Nilsen (Dept. of Teacher Education and School Research).

Song, Jayeong: *Beyond the Results: Identifying Students' Problem Solving Process on A Problem Solving Task.* Supervised by Professor Ronny Scherer.

Tan, Tony: *Identifying School Climate Variables Associated with Financial Literacy Outcomes in PISA 2018 Data. A Multilevel Structural Equation Modelling Approach.* Supervised by Professor Ronny Scherer.

AUTUMN 2021:

Alhustein, Mudar Muhamad Saied Muhiemed: *The Finnish Line: Student's ICT Use, Reading Attitudes and Reading Performance in Three Nordic Countries.* Supervised by Professor Ronny Scherer and Professor Ove Edvard Hatlevik (OsloMet)

Anand, Dhanalakshmi: *The Influence of Principal Leadership on School Innovativeness.* Supervised by Dr. Trude Nilsen (Dept. of Teacher Education and School Research), Professor Ronny Scherer and Professor Sigrid Blömeke.

Montazerikafrani, Fatemeh: *Do Culture and Reading Literacy Associate with Inconsistent Responding on Mixed – Worded Scales?* Supervised by Postdoctoral fellow Isa Steinmann and Professor Johan Braeken.

THE 2020-2022 COHORT

The 2020 cohort is now halfway through their studies and will finish the program in spring 2022. They have followed a packed program that has provided them with the knowledge and skills needed to succeed as PhDs or assessment professionals. Throughout the program, the students have delivered research reports, worked collaboratively, presented their findings to multiple audiences, and responded to feedback from peers. They have developed algorithmic skills in statistical computation and are familiar with the open-source software R.



3. Outreach Activities

An explicit mission of CEMO is to reach out to practitioners and stakeholders who are responsible for assessments in education and in need of knowledge about measurement, assessment, and evaluation. Assessment results often have a profound impact both on individuals, such as teachers or students, and on institutions, such as schools or municipalities. In combination with the fact that measurements often are technically complex, this generates a need for information on the side of students, parents, teachers, school-leaders, politicians, and administrative bodies. CEMO activities to meet such needs range from collaborating with academic and non-academic stakeholders in Norway and the Nordic countries to producing outlets for a range of popular media channels.

Evaluation of the Norwegian school exams and the recent curriculum reform

In 2020, a large curriculum reform called *Fagfornyelsen* was implemented in Norwegian schools. As part of this change, the Ministry of Education and Research established a group of researchers and practitioners in 2018 whose task was to evaluate the exam system in place at the end of primary and secondary school education. CEMO Director Sigrid Blömeke led this work. In 2019, the group published a large summary of the state-of-research: <https://www.udir.no/tall-og-forskning/finn-forskning/rapporter/Kunnskapsgrunnlag-for-evaluering-av-eksamen-sordningen/>. Based on this knowledge, the group developed suggestions for changes and published these in 2020: <https://www.udir.no/eksamen-og-prover/eksamen/vurderinger-og-anbefalinger-fremtidens-eksamen/>. As a consequence of the group's work, a broad range of changes will be implemented from 2021 and onwards.

In addition, CEMO is part of an evaluation of the implementation and the effects of the curriculum reform *Fagfornyelsen* itself. The project runs from 2019 to 2025 and is funded by the Norwegian Directorate for Education and Training. All four units at the Faculty of Educational Sciences are involved. Professor Rolf Vegar Olsen represents CEMO in this project and leads one work package that has a coordinating role across the whole project with respect to survey development, data integration, and reporting. Other research areas are processes around development of new curricula, quality of the support structures, governance issues involved, and how it is perceived by teachers and students.

Websites and social media

During 2021, we have seen an increase in the numbers of followers on social media. Both Twitter (715 followers) and Facebook (1278 followers) were used actively to spread information about CEMO's

research activities, possibilities, and cooperation. On the websites, the main features remain the personal pages for each CEMO member, information about CEMO's research and teaching, upcoming events, and the list of publications. CEMO has also become active in producing podcasts (read more below). Moreover, two of our PhD candidates are involved in blog activities: <https://international-education.blog/en/>.

Podcast series Learning at the Faculty of Educational Sciences (in Norwegian)

A series of podcasts has been launched by the faculty to disseminate knowledge created by researchers. In 2021, CEMO was invited to produce two podcasts: "What do we measure in national assessments – and what not?", Professor Rolf Vegar Olsen and PhD candidate Henrik G. Ræder

When national tests were introduced in the Norwegian school system, it was meant to both support the teachers work in the classroom and to provide adequate information to school leadership. The question is whether the national tests can support both these purposes. The government has said that they aim to change these national tests. In this podcast, Professor Rolf Vegar Olsen and PhD candidate Henrik Galligani Ræder discuss what these new tests can look like and how they can provide teachers with better information.

<https://www.uv.uio.no/forskning/aktuelt/podkast/laering/nasjonale-prover-hva-maales.html>

"How can we support innovativeness of schools and what does it mean?", Professor Sigrid Blömeke and Dr. Trude Nilsen (Department of Teacher Education and School Research)

An innovative school culture is important for adaptability to societal challenges and for students to cope in tomorrow's society. They must be able to keep

up with digital development, succeed in the labor market of the future, and be able to adapt to multicultural society. The Norwegian government has stated that innovation in the public sector, including schools, is the main strategy for solving challenges that society will face in the years to come. In this podcast, Professor Sigrid Blömeke and Senior Researcher Trude Nilsen explain how this can be done.

The podcast is based on a research article and was accompanied by an article on forskning.no: <https://www.uv.uio.no/forskning/aktuelt/podkast/laering/hva-fremmer-innovasjon-i-skolen.html>

Selection of further activities

Consultancy for/member of national and international governmental bodies

- Directorate for teaching and training and units developing the national assessments
- Parliamentary hearing on changes of the national assessments in Norway
- National assessment system in Denmark
- OECD PIAAC Adaptive Problem-Solving Expert Group
- Norwegian PIAAC Advisory Board at the Ministry of Education
- OECD TALIS Questionnaire Expert Group
- Advisory Board for Knowledge Centre for Education (University of Stavanger)
- External reference group for access to tertiary level education in Sweden
- IEA ICILS 2023 questionnaire expert group

Collaboration with partners outside of UiO

- Norwegian Business School (BI)
- Educational technology companies (Studix and MadeToGrow)
- Kompetanse Norge (Skills Norway)
- Norwegian Centre for Mathematics Education
- Norwegian Defence University College
- Oslo University Hospital

4. CEMO Alumni

CEMO prides itself on providing an environment that allows our PhD candidates and Postdoctoral fellows as the next generation of assessment and measurement experts to develop and grow so that, when they are ready for their next challenge, they are equipped with the experience and skills needed to succeed. Already in the centre's early years, we could provide evidence for our accomplishments in this respect. CEMO Postdoctoral fellow Ronny Scherer became Full Professor first at the Department of Teacher Education and School Research at the University of Oslo and then at CEMO, Postdoctoral Stefan Schaubert became Associate Professor at the Medical Faculty and is now formally affiliated with CEMO. Associate Professor Johan Braeken was promoted to Full Professor at CEMO.

A few years later, since 2018, we have been able to watch our first PhD candidates graduate and several Postdoctoral fellows receive offers from other employers. In 2021, we caught up with some of our former researchers to reflect on their time at CEMO and also find out more about what they are working on now.

PhD Alumni



Dr. Stephan Daus

Dr. Stephan Daus joined CEMO in 2014 and defended his thesis in 2018. He came to CEMO with two Master degrees from London School of

Economics and Political Science and the University of Manchester. After completing his PhD, he began working as a senior researcher at the Nordic institute for the studies of innovation, research and education (NIFU) in Oslo.

His comments: "My time at NIFU has almost exclusively been spent at planning, designing, executing, analysing, and reporting questionnaire surveys to pupils or teachers on a range of topics. Hence, my training and professional networking during my time at CEMO has been greatly useful in shaping my methodological and substantive competences and interests. My experience from CEMO, combined with a lack of similarly trained colleagues, has put me in charge of the survey methods group at NIFU, which involves training and guiding colleagues, developing routines, and staying updated on recent studies in survey and measurement methodology, and instrument developments.

Simultaneously, my work experience at NIFU has been immensely helpful in learning the more practical sides of design, collection, management, and reporting of messy data – as well as **providing me acquaintance** with issues of great importance that are often ignorable for secondary data analysts, such as the importance of survey invitation crafting, quality controls, data cleaning and continued development of instruments”.



**Dr. Kondwani Kajera
Mughogho**

Dr. Kondwani Kajera Mughogho joined CEMO in 2016. Since leaving CEMO, he works

as a psychometrician and statistician at the Centre for Statistics, National Foundation for Educational Research (NFER) in Slough, United Kingdom. His current responsibilities include assisting in conducting quantitative research; conducting psychometric and statistical analysis of research and assessment data; contributing to the writing of project reports and other research outcomes; and contributing to the development project proposals.

His comments: “I chose CEMO because it gave me the opportunity to study under Professors Leslie and David Rutkowski, my supervisors, advisors and friends for whom I am grateful. As principal investigators on the Norwegian Research Council-funded project, “Embracing Heterogeneity in International Surveys”, I knew that I would receive the best support and tutelage to be successful as a junior researcher and beyond. The project, and its network of researchers offered a wealth of researchers that I could draw from with regards to technical and professional advice among other things. In addition, the courses offered at the CEMO, were more than sufficient to expose me to a wide range of topics, and emerging issues in

the field of Educational Measurement. CEMO and all members affiliated to CEMO provided a system that would be greatly supportive and would ultimately foster my success as a young researcher. Furthermore, it was clear that CEMO would be a greatly motivating work place that had all of the resources that would contribute to my overall success.”



**Dr. Melaku Tesfa
Tesema**

Dr. Melaku Tesfa Tesema joined CEMO in 2017. He is our most recent

graduate and defended his thesis at the end of 2021. Originally a mathematics teacher, Tesema came to CEMO with a lot of experience from his work at the Ethiopian Ministry of Education and the Civil Service University. At CEMO, he was also a research assistant for several years.

He comments: “I joined CEMO as a PhD fellow after I received a scholarship from the Norwegian Government. My life at CEMO has been a time of major changes in my personal and academic life. Most importantly, CEMO was the place where I gained the experience, knowledge and qualification required to become competent in academic and non-academic jobs. Specifically, the most useful perk for me was the ability to think critically about almost everything. The program taught me how to analyze data and information, to identify gaps, and to draw conclusions based on what I know and what I don’t. This, I think, will be invaluable throughout my career. Further, the diversity of staff composition at CEMO was very critical for me to gain more international exposure and experience.”



Postdoc Alumni



**Dr. Alexandra
Niculescu**

Dr. Alexandra Niculescu joined CEMO in 2018 as a Postdoctoral fellow on the ADAPT21-project.

She has an international profile, is active in pedagogical design and innovation in higher education, with a PhD degree from Maastricht University, the Netherlands. Before moving to Norway, she worked and collaborated with several academic, governmental and non-profit institutions (Harvard Medical School, Romanian Ministry of Health, the United Nations Institute for Training and Research). Niculescu was offered a job as an Educational Scientist at the École Polytechnique Fédérale de Lausanne (EPFL) and relocated to Switzerland in 2021. At the Center for Learning Science of EPFL, she conducts research under the mandate of the Vice-President for Education, with a focus on improving educational assessments and teaching across the 1st year of study.

During her time at CEMO, her focus was on constructing and validating an innovative assessment

for adaptability as a 21st century skill. This involved conceptually designing an assessment around the construct of adaptability as well as building a web-based App (ADAPT21).

She comments: “CEMO has the reputation of being one of the best centers in Educational Measurement in Europe. Working there, I understood that this reputation was due to the high competency of its professors and staff. Maybe even more importantly, the working culture at CEMO was unprecedented: supportive, communicative, inclusive and friendly. I felt like being part of a big viking family, where my fellow colleagues and the supervisors offered me all the conditions to flourish and grow professionally. I would like to thank in particular Professor Rolf Vegar Olsen who was like a second mentor to me, to Professor Johan Braeken for his advice, to Associate Professor Stefan Schaubert for making time for small talk and for being willing to serve as my teaching assistant, to Professor Sigrid Blömeke for her leadership style and, of course, to Professor Ronny Scherer for his unconditional support. From the PhD candidates, Jarl Kleppe Kristensen and Henrik Raeder made my time in Oslo feel like home! I hope to return for a visit, a PhD defense or a friend’s wedding”.

5. Summary of goal accomplishment in 2021 and Outlook to 2022

The CEMO team has developed a 3-year plan with specific short-, mid-, and long-term objectives for 2019 to 2021 regarding research, teaching, outreach and organization. The plan is updated regularly. In the following, we look back at our goals in 2021 and provide insight into our plans for 2022.

Research in 2021

Our overall objective regarding research over the years 2019 to 2021 was to sharpen and strengthen our research profile and visibility nationally and internationally to accomplish our long-term goal of becoming the leading Nordic and European centre within educational measurement. With respect to 2021, this meant, among others, to:

- to have a broad range of activities (*partly accomplished due to the corona pandemic*), and to establish the FREMO conference as a brand (*not yet accomplished, conference postponed due to the Covid-19 pandemic*);
- publish with high-quality in journals with an social science citation impact factor >1 or in journals on level (2) according to the Norwegian publication system (*accomplished*), at least one article in a leading Q1 journal (*accomplished*), and to publish in Norwegian and Nordic outlets (*accomplished*);
- further develop the robustness of the centre and the quality of its research by expanding our portfolio of external grants (*partly accomplished, no new external grant in 2021, but several new applications submitted*) and preparing an application for a Centre of Excellence or an individual ERC grant (*accomplished the Centre of Excellence application*);

- provide extensive support for our Postdoctoral fellows and PhD candidates in terms of good mentoring or supervision practices and frequent opportunities to present their work internally and externally (*accomplished with respect to internal presentations, not accomplished with respect to external ones due to the Covid-19 pandemic*), participation in teaching activities (*accomplished*); and
- strengthen our international network through recruiting highly-qualified Gustafsson and Skrondal scholars (*accomplished, recruited a candidate in 2021 with start in early 2022*), a meeting with the International Advisory Board (*accomplished in a digital version*), have additional guest researchers with their own funding and collaborate with international research units (*accomplished towards the end of 2021*).

One of our goals each year is to publish at least one article that has agenda-setting potential. It is difficult to evaluate this goal already in the year after a publication. Therefore, we use the number of citations with respect to articles published the year before. We had 14 articles published in 2020 that had received at least 10 citations at the end of 2021 according to Google Scholar. This was about the same number of articles as the year before (12). One of these stands

out with more than 60 citations already now: Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2019). Strategies to prepare pre-service teachers for Technological Pedagogical Content Knowledge (TPACK): A mixed-method study. *Educational Technology Research & Development*, <https://doi.org/10.1007/s11423-019-09692-1>. The topic is related to the topic of last year's article mentioned here and written by authors from the same research group.

Teaching in 2021

Our overall objective regarding teaching over the years 2019 to 2021 was to offer a high-quality Master of Science program in Assessment, Measurement and Evaluation and to attract a large pool of highly qualified national and international applicants. With respect to 2021, this meant, among others, to:

- develop a new structure for the master program starting autumn 2022 (*accomplished*),
- attract a large and qualified enough pool so that we can once more fill all study places (*accomplished with 21 students*)
- receive positive feedback from students regarding teaching quality (*accomplished*); and
- have a good throughput (*partly accomplished and therefore needs further work*).

Outreach in 2021

Our overall objective regarding outreach over the years 2019 to 2021 is to be visible in the Norwegian and the Nordic context. With respect to 2021, this meant, among others, to:

- establish a Norwegian board with representatives of the professional testing field besides the already existing scientific international advisory board (*accomplished, board members are recruited in 2021 and the new board begins in January 2022*) and publish a textbook or an article in a popular science outlet such

as forskning.no (*accomplished*); and

- create a network in assessment, measurement and evaluation as part of the Nordic Educational Research Association (NERA) (*accomplished*) and publish at least one article in a journal with a Nordic focus (*accomplished*).

Human Resource Management 2021

Our overall objective regarding CEMO as an institution over the course of the next three years was to offer our team members a stable, productive and enjoyable working environment. With respect to 2020, this meant, among others, to:

- establish CEMO as a level 3 unit at the Faculty of Educational Sciences with secure basic funding at the current size (*accomplished*);
- collaborate with the other three departments at the Faculty of Educational Sciences (*accomplished*);
- give a voice to all team members and include them in decision-making processes (*partly accomplished, but limited by the Covid-19 pandemic and home office most of 2021*), ensure good information flow and communication styles (*accomplished despite the challenges of the Covid-19 pandemic with digital meetings*), and have regular joint social activities that have the potential to include all team members (*not accomplished due to the Covid-19 pandemic*); and
- have effective administrative routines for core processes that are continuously reviewed and updated (*accomplished*).

6. Management and Administration

CEMO is organized directly under the Faculty of Educational Sciences at the University of Oslo, and the Centre Director reports to the Dean. The Ministry of Education and Research and the University of Oslo are CEMO’s main funders until 2023. They constitute the final reporting entities that define the guidelines under which CEMO operates.

Administrative structure

Professor Sigrid Blömeke (Director) and Professor Rolf Vegar Olsen (Deputy Director) spearhead CEMO. An administrative head, Tara Sarin, supports the centre management. The CEMO leadership team represents CEMO at the Faculty and higher UiO levels as well as outside the university. The CEMO board is responsible for major decisions; these include strategic decisions about CEMO’s research, teaching and outreach profile, recruitment strategies and employments as well as the management of the CEMO budget.

The CEMO administration consists of four employees and is responsible for the daily running of CEMO. Operative tasks of the administration include, among other things, coordination of the master program, research support, external communication, facilitating a good reception and stay for guests, maintenance of the websites and social media, secretarial function for board meetings, recruiting interviews, and scientific advisory board meetings, and organizing and implementing the different arrangements like courses,

seminars, and workshops. CEMO’s administration also functions as permanent secretariat for the CEMO Board and the International Advisory Board.

The administration at the Faculty of Educational Sciences assists in employments at CEMO as well as in budgeting and accounting. The Faculty of Educational Sciences also provides IT support.

The CEMO Board

The CEMO Board is an administrative body that meets three to four times per year to approve the CEMO budget, the director’s progress reports about research, teaching and outreach activities at CEMO and employments. In addition, the Board members provide feedback on CEMO’s activities from an internal perspective. The Board included in 2021 the heads of the three Departments at the Faculty of Educational Sciences, an employee representative and a student representative. All meetings took place digitally. The composition of the board will change in 2022.

The CEMO Board	
Name	Affiliation
Chair: Prof. Dijana Tiplic	Head of Department of Teacher Education and School Research, UiO
Prof. Ona Bøe Vie	Head of Department of Special Needs Education, UiO
Prof. Ola Erstad	Head of Department of Education, UiO
Jarl Kleppe Kristensen	Employee representative
Sadaf Basharat	Student representative

CEMO's International Scientific Advisory Board

CEMO has an international scientific advisory board (SAB) consisting of world-class scientists. The SAB's mandate is to critically evaluate and provide advice on the centre's scientific performance and progress.

The board met virtually in January 2021. The

agenda included general strategic issues, research and recruitment politics, the master program, outreach work, the FREMO research group, research on the Norwegian assessment system, research innovations ahead, and external funding applications. They provided positive and constructive feedback on CEMO's research, teaching, and outreach activities.

International Scientific Advisory Board	
Name	Affiliation
Prof. Cees Glas	University of Twente, The Netherlands. Chair of the Department of Research Methodology, Measurement and Data Analysis
Prof. Stephen Sireci	University of Massachusetts Amherst, USA. Director of the Center for Educational Assessment.
Prof. Petra Stanat	Humboldt University Berlin, Germany. Head of the Department "Education and Integration"; Director of the Institute for Educational Quality Improvement (IQB) at the Humboldt University of Berlin, Germany.
Prof. Carolin Strobl	University of Zürich, Switzerland. Head of the Research unit.



7. Finances

Revenues and expenditures 2021

		Financial statement	Forecast
Opening balance		-12 300 482	-12 300 482
Total Opening balance		-12 300 482	-12 300 482
Funding	Core funding	-15 526 045	-15 364 940
	External income	0	0
	Income from sales	-61 965	0
Total funding		-15 588 010	-15 364 940
Staff expenses	Salary cost	12 516 064	12 428 555
	Salary (variable)	144 001	0
	Holiday pay, payroll tax, pension	5 059 918	5 202 695
	Salary expenses	17 295	0
	Other refunds	-890 969	0
	Hourly salary	394 819	144 135
Total staff expenses		17 241 128	17 775 385
Operating expenses	Consultancy service	236 358	0
	Rent	2 590 800	2 590 850
	Travel costs, courses, conference	359 727	1 086 000
	Other operating expenses	367 894	1 504 150
Total Operating expenses		3 554 779	5 181 000
Investments	Investments	193 937	100 000
Total investments		193 937	100 000
Netto contribution	Own funding (UiO)	904 608	1 833 674
	Overhead	-1 101 351	-1 686 278
	Salary Reimbursement	-503 578	-1 911 079
Total netto contribution		-700 321	-1 763 683
Project closing balance	Project closing balance	-79 450	0
Total project closing balance		-79 450	0
Total		-7 678 419	-6 372 720



8. Appendices

CEMO team members

Name	Nationality	Position
Blömeke, Sigrid	Germany	Professor/Director
Olsen, Rolf Vegar	Norway	Professor/Deputy Director
Braeken, Johan	Belgium	Professor
Scherer, Ronny	Germany	Professor
Andersson, Björn	Sweden	Associate Professor
Schauber, Stefan K.	Germany	Associate Professor, primarily affiliated with the Faculty of Medicine
Chen, Chia-Wen	Taiwan	Postdoctoral Fellow
Niculescu, Alexandra C.	Romania	Postdoctoral Fellow <i>Until September 2021</i>
Reis Costa, Denise	Brazil	Postdoctoral Fellow
Steinmann, Isa	Germany	Postdoctoral Fellow
Tesema, Melaku Tesfa	Ethiopia	PhD Candidate <i>Defended November 2021</i>
Mughogho, Kondwani K.	Malawi	PhD Candidate <i>Defended February 2021</i>
Van Laar, Saskia	Netherlands	PhD Candidate
Ræder, Henrik Galligani	Norway	PhD Candidate
Haakstad, Haakon T.	Norway	PhD Candidate
Veletic, Jelena	Bosnia	PhD Candidate
Ye, Wangqiong	China	PhD Candidate
Kristensen, Jarl Kleppe	Norway	PhD Candidate
Zhang, Maoxin	China	PhD Candidate
Helland-Riise, Fredrik	Norway	PhD Candidate
Gonzalez Campos, Diego	Colombia	PhD Candidate
Arencibia Alemán, José Manuel	Spain	PhD Candidate
Tan, Tony	Australia	PhD Candidate <i>From August 2021</i>
Sosa, Yuriko	Peru	PhD Candidate <i>From October 2021</i>

Marcq, Kseniia	Russia	PhD Candidate
Skrondal, Anders	Norway	Adjunct Professor
Rutkowski, Leslie	USA	Adjunct Professor
Rutkowski, David	USA	Adjunct Professor
Frey, Andreas	Germany	Adjunct Professor <i>Until June 2021</i>
Maddox, Bryan	United Kingdom	Adjunct Professor
Sarin, Tara	Norway/USA	Head of Administration
Heslien, Siri A.P.	Norway	Senior Executive Officer
Jordal Aase, Malene	Norway	Higher Executive Officer <i>From August 2021</i>
Grønlid, Gunnhild Nedberg	Norway	Higher Executive Officer
Basharat, Sadaf	Pakistan	Research Assistant
Israilova, Komolakhon	Uzbekistan	Research Assistant
Qin, Qi	China	Research Assistant
Sánchez Ruiz, Jesus Daniel	Peru	Research Assistant

CEMO guest researchers

Name	Nationality	Period
Hanzlová, Radka	The Czech Republic	October 2021-December 2021
Michaelides, Michalis	Cyprus	December 2021
Jin, Shaobo	China	October 2021

CEMO events

PhD Research Seminar

Together with the research group Large-scale Educational Assessments (LEA), FREMO organizes a research seminar for the PhD candidates connected to these research groups. During the course of the seminar, the PhD candidates present their research projects and provide feedback to the other candidates. They also present their work-in-progress and discuss journal articles. The seminar leader for the course is Associate Professor Björn Andersson. During 2021, the following events took place within the seminar:

Date	Activity
February 23	Presentation and discussion of Kseniia Marcq's project description "The blind side: Exploring item difficulty in international large-scale assessments". Response from Bas Senden.
March 9	Mid-term evaluation of Terje Throndsen (Dept. of Special Needs) "Individual differences in numeracy development – An eye tracking study". Presentation and discussion of José Arencibia Alemán's project description "Predictive Validity of Educational Attainment Measures in Norway". Response from Diego Gonzalez Campos.
May 4	Presentation and discussion of relevant projects: <ul style="list-style-type: none">• Oleksandra Mittal (Dept. of Teacher Education and School Research): "Capturing Socioeconomic Status across Ethnic Majority and Minorities in PISA 2018: Testing Home Possessions Scale of Measurement Invariance and Differential Item Functioning".• Diego Gonzalez Campos: "When Meta-Analysis Meets International Large-Scale Assessment Data: Applications of the Split, Analyse, and Meta-Analyse Approach".• Bas Senden (Dept. of Teacher Education and School Research): "Student ratings of instructional quality: construct validity and the contribution to student achievement".
September 14	Presentation and discussion of Tony Tan's project. "A quantitative enquiry into the fairness and equity in Norwegian secondary school assessment practices". Response from José Arencibia Alemán.
October 18	Presentation and discussion of Kseniia Marcq project. "A meta-overview of the PISA background questionnaire scales' properties". Presentation and discussion of José Arencibia Alemán's project. "Analysis of potential sources of discrepancy across lower-secondary education attainment measures in Norway".
November 16	Seminar about the development of the research project and application for the project to NFR: "Career development seminar – external funding applications".

Brown Bag Seminars

During 2021, the following presentations took place:

Date	Speaker	Title
Feb. 16	Erika Majoros, Gothenburg University	Linking Recent and Older IEA Studies on Mathematics
Mar. 2	Sigrid Blömeke (CEMO), Ronny Scherer (CEMO, and Trude Nilsen (Dept. of Teacher Education and School Research)	Quantifying effects of school innovativeness
Mar. 16	Jarl Kristensen, CEMO	Detecting student affect and behavior in interaction with educational learning tools
Apr. 27	Wangqiong Ye, CEMO	Teacher and principal perceptions of school emphasis on academic success and their effects on students' mathematics achievement
May 11	Jelena Veletic, CEMO	School Leadership and Quality of School Climate across the World
May 25	Maixin Zhang, CEMO	Beyond proficiency: what can we learn from log data?
June 15	Kseniia Marcq, CEMO	The blind side: Exploring item variance in PISA 2018 cognitive domains
Aug. 31	Isa Steinmann, CEMO	The Link between Gender Gaps in Secondary School Enrollment and Achievement
Sep. 21	Fredrik Helland-Riise, CEMO	Presentation of a research design for studying the measurement qualities of the Norwegian Session tests
Sep. 28	Chia-Wen Chen, CEMO	Exploring the relationship among performance, time on task, and actions of Scandinavian students on PISA 2012 mathematic tasks
Oct. 5	Henrik Ræder, CEMO	Sub-scales of numeracy from grade 5 to grade 8
Oct. 26	Haakon Eidem Haakstad, CEMO	The impact of checklist-lengths on the diagnostic performance of OSCE-based pass/fail decisions
Nov. 2	Wangqiong Ye, CEMO	School and classroom characteristics associated with the trends of academic resilience in Norway and Sweden
Nov. 30	Jarl Kristensen, CEMO	Effects of app-based morphological training on word knowledge in primary school children

Get to know CEMO – beyond the numbers

This was a one-day online event held on September 7, 2021, where CEMO staff showcased their research. At the event, PhD candidates, postdoctoral fellows, and senior staff from CEMO presented their research in the following topical areas:

- Measurement challenges in a modern world
- Designing tests: Science or art?
- Beyond item responses: Assessment with new types of data

- New uses of large-scale assessment data
- Norwegian assessments: Past, present and future

October Gathering in Psychometrics

CEMO and the Norwegian Business School (BI) organized a half-day gathering in psychometrics on October 28, 2021 at Forskningsparken in Oslo. The event consisted of a series of presentations within Applications of Psychometrics, Estimation Methods, and Psychometric Theory. There have been discussions with BI to have this as an annual event.

Oslo UseR! Group event: Meta-analysis in R with {metafor}

Together with the Oslo UseR! Chapter, CEMO hosted two events on meta-analysis in August and September. CEMOs very own PhD candidate Diego G. Campos gave a talk on “Introduction to Meta-Analytic Structural Equational Modeling with {metaSEM}”.

PhD Courses

Spring 2021

UV9297: Measurement Models, Ronny Scherer, spring 2021

The course introduces the fundamental theories and application of measurement models.

UV9293: Item Response Theory, Björn Andersson, spring 2021

The course introduces the core concepts and techniques of item response theory (IRT) which underlie current test design strategies, psychometric analyses, and evaluation of assessment instruments

UV9040A: Research Seminar, Björn Andersson, spring and autumn 2021

The intention with the research seminar is to follow-up the PhDs during the first two years, as well as to create an environment for research collaborations.

UV9296: Methods for Causal Inference in Educational Research, Jan-Eric Gustafsson, autumn 2021

The main purpose of the workshop is to give an introduction to techniques for making credible causal inferences from observational data and how such techniques can be used in educational research.

Autumn 2021

UV9216: General Course in Meta-Analysis, Ronny Scherer (together with Monica Melby-Lervåg, Dept. of Special Needs Education), autumn 2021

This course provides an introduction to key principles of meta-analysis, including random-effects models and effect size multiplicity.

UV9218: Linear Models, Johan Braeken, autumn 2021

This course provides an introduction to principles, terminology, and strategies for statistical modelling with the linear model as initial framework for data analysis.

UV9253: Multilevel Models, Ronny Scherer, autumn 2021

The course introduces the fundamental theories and application of multilevel models.

UV9290: Data Science, Johan Braeken, autumn 2021

The focus is on the core concepts and techniques that function as foundations for formulating and implementing successful data-based analysis strategies to perform evidence-based research.

UV9291: Principles of Measurement, Björn Andersson, autumn 2021

In this course, the focus is on the foundational theories and concepts in measurement.

UV9294: Analysis of International Large-Scale Assessments, Isa Steinmann, autumn 2021

This workshop aims to communicate both knowledge and hands-on analytical skills in the field of international large-scale assessment (ILSA) data.

UV9258: Machine Learning in Education, Denise Reis Costa, autumn 2021

This workshop will introduce participants to the field of machine learning for the analysis of educational data.

CEMO Awards

Sigrid Blömeke elected as a member of the Norwegian Academy of Sciences

Centre Director Sigrid Blömeke received her membership diploma on 3 May 2021 and is now officially inducted into the Norwegian Academy of Sciences and Letters, a prestigious academic society in Norway that serves to support the advancement of science and scholarship both nationally and internationally. Membership is achieved through a formal selection process based on scientific merits and has both Norwegian and international members who are divided into two categories, the humanities and social sciences and the mathematical-natural sciences. Sigrid Blömeke is elected as a member in the category humanities and social sciences. She says: "It is an honor to become a member of the Norwegian Academy of Sciences. I interpret the nomination and the election as a recognition of the research environment we have built up at the Faculty of Educational Sciences".

University of Oslo Cultural and Social Activities Award

PhD candidate Henrik G. Ræder received the University of Oslo Cultural and Social Activities Award for 2021, together with a PhD candidate from the Faculty of Law. They were the first PhD candidates to be awarded the prize. The justification by the selection committee: "both extend far beyond their work responsibilities when it comes to spreading joy and motivation to their colleagues". Ræder describes his contribution as the following: "Every year new members enter the center who have moved here from abroad. Upon arrival, they do not have a social network in Norway or know the most basic things – such as where the nearest store is or what to do on the weekends in this unknown country". He uses a large part of his free time taking care of our foreign employees at CEMO and make them feel welcome. Based on this initiative, we have now established **CEMO's Social Event Managers (SEM)** that consists of both administrative and research staff (Malene Jordal Aase, Diego G. Campos, Henrik Ræder and Maoxin Zhang). They plan monthly social and cultural events for our staff.

CEMO students receive student innovation grants

Two of our master's students, Tony Tan and Jayeong Song, have been awarded student innovation grants from the Faculty of Educational Sciences. In addition to financial support, they will get access to developers and resources, and receive support on design and concept development from EngageLab.

The projects look into developing a smart interface for a Learning Management System (LMS) for the teacher and student and developing an algorithm-based tool for planning your own online education. Jayeong describes her project this way: My project "your school" is developing a tool to organize one's own learning path using the MOOCS (the free online courses that are made available for anyone to study). Imagine the Netflix that recommends your own learning course!

CEMO Production

Publications

*Contributors affiliated with CEMO in bold

Andersson, Björn; Luo, Hao; Wong, Gloria; Lum, Terry (2021). Linking the Scores of the Montreal Cognitive Assessment 5-min and the interRAI Cognitive Performance Scale in Older Adults With Mild Physical or Cognitive Impairment. *Frontiers in Psychiatry*; Volum 12.

Backfisch, Iris; **Scherer, Ronny**; Siddiq, Fazilat; Lachner, Andreas; Scheiter, Katharina (2021). Teachers' technology use for teaching: Comparing two explanatory mechanisms. *Teaching and Teacher Education: An International Journal of Research and Studies*; Volum 104.

Blömeke, Sigrid; Nilsen, Trude; **Scherer, Ronny** (2021). School Innovativeness Is Associated With Enhanced Teacher Collaboration, Innovative Classroom Practices, and Job Satisfaction. *Journal of Educational Psychology*.

Brosseau, Danielle; **Braeken, Johan**; Carmack, Cindy; Rosberger, Zeev; Körner, Annett (2021). We think we can: development of the Dyadic Efficacy Scale for Cancer. *Journal of Psychosocial Oncology Research and Practice*; Volum 3 (4).

Chen, Chia-Wen; Wang, Wen-Chung; Mok, Magdalena Mo Ching; **Scherer, Ronny** (2021). A Lognormal Ipsative Model for Multidimensional Compositional Items. *Frontiers in Psychology*; Volum 12. s. 1-19.

Damsa, Crina I.; Langford, Malcolm; **Scherer, Ronny**; Uehara, Dan. (2021). Teachers' agency and online education in times of crisis. *Computers in Human Behavior*; Volum 121.

Dörendahl, Jan; **Scherer, Ronny**; Greiff, Samuel; Martin, Romain; Niepel, Christoph (2021). Dimensional Comparisons in the Formation of Domain-Specific Achievement Goals. *Motivation Science*; Volum 7 (3), pp. 306-318.

Dunekacke, Simone; **Blömeke, Sigrid** (2021). Early mathematics education: What do pre-service teachers learn?. I: Early Childhood Teachers' Professional Competence in Mathematics. *Routledge*, pp. 119-131.

Dunekacke, Simone; Jenßen, Lars; **Blömeke, Sigrid** (2021). The role of opportunities to learn in early childhood teacher education from two perspectives: A multilevel model. *Zeitschrift für Erziehungswissenschaft*.

Engelhardt, Lena; Naumann, Johannes; Goldhammer, Frank; **Frey, Andreas**; Horz, Holger; Hartig, Katja; Wenzel, S. Franziska C. (2021). Development and Evaluation of a Framework for the Performance-Based Testing of ICT Skills. *Frontiers in Education*; Volum 6, pp. 1-15.

Fink, Aron; Spoden, Christian; **Frey, Andreas**; Naumann, Patrick (2021). Kriteriumsorientiertes adaptives Testen mit der KAT-HS-App. *Diagnostica*; Volum 67 (2), pp.110-114.

Frey, Andreas; Fink, Aron (2021). Increasing test efficiency in an international assessment of teachers' general pedagogical knowledge through multidimensional adaptive testing. I: Teaching as a knowledge profession. Studying pedagogical knowledge across educational systems. *OECD Publishing*, pp. 123-140.

Frey, Andreas; Spoden, Christian; Schultze, Martin (2021). Die Zukunft der Hochschulklausuren hat bereits begonnen. *Psychologische Rundschau*, Volum 72 (2), pp. 113-116.

Greiff, Samuel; Graesser, Arthur C.; Iliescu, Dragos; Rouet, Jean-François; Scheiter, Katharina; **Scherer, Ronny**; Gottschling, Juliana; Dörendal, Jan (2021). PIAAC Cycle 2 assessment framework: Adaptive problem solving. I: The Assessment Frameworks for Cycle 2 of the Programme for the International Assessment of Adult Competencies. *OECD Publishing*.

Hammerstein, Svenja; König, Christoph; Dreisörner, Thomas; **Frey, Andreas** (2021). Effects of COVID-19-Related School Closures on Student Achievement-A Systematic Review. *Frontiers in Psychology*; Volum 12, pp. 1-14.

Hosoya, Georg; **Blömeke, Sigrid**; Eilerts, Katja; Jenßen, Lars; Eid, Michael (2021). Absolute and Relative Judgment Accuracy: Early Childhood Teachers' Competence to Evaluate Children's Mathematical Skills. *Frontiers in Psychology*; Volum 12.

Jenßen, Lars; Eid, Michael; Szczesny, Markus; Eilerts, Katja; **Blömeke, Sigrid**. Development of Early Childhood Teachers' Knowledge and Emotions in Mathematics During Transition From Teacher Training to Practice. *Journal of Educational Psychology*; Volum 113 (8), pp. 1628-1644.

Kalandadze, Tamara; **Braeken, Johan**; Brynskov, Cecilia; Næss, Kari-Anne Bottegaard (2021). Metaphor Comprehension in Individuals with Autism Spectrum Disorder: Core Language Skills Matter. *Journal of Autism and Developmental Disorders*; pp. 1-11.

Kampa, Nele; **Scherer, Ronny**; Saß, Steffani; Schipolowski, Stefan (2021). The relation between science achievement and general cognitive abilities in large-scale assessments. *Intelligence*; Volum 86.

Karlsen, Jannicke; Hjetland, Hanne Næss; Hagtvet, Bente Eriksen; **Braeken, Johan**; Melby-Lervåg, Monica (2021). The concurrent and longitudinal relationship between narrative skills and other language skills in children. *First language*.

Kinge, Jonas Minet; Øverland, Simon Nygaard; Flatø, Martin; Dieleman, Joseph; Røgeberg, Ole Jørgen; Magnus, Maria Christine; Evensen, Miriam; Tesli, Martin Steen; **Skrondal, Anders**; Stoltenberg, Camilla; Vollset, Stein Emil; Håberg, Siri Eldevik; Torvik, Fartein Ask (2021). Parental income and mental disorders in children and adolescents: prospective register-based study. *International Journal of Epidemiology*; Volum 50 (5), pp. 1615-1627

König, Johannes; **Blömeke, Sigrid**; Jentsch, Armin; Schlesinger, Lena; née Nehls, Caroline Felske; Musekamp, Frank; Kaiser, Gabriele (2021). The links between pedagogical competence, instructional quality, and mathematics achievement in the lower secondary classroom. *Educational Studies in Mathematics*; Volum 107 (1), pp. 189-212

Müller, Martin; Schechter, Clyde B.; **Hautz, Wolf E.**; Sauter, Thomas C.; Exadaktylos, Aristomenis; Stock, Stephanie; Birrenbach, Tanja (2021). The development and validation of a resource consumption score of an emergency department consultation. *PLOS ONE*; Volum 16 (2).

Nilsen, Trude; **Scherer, Ronny**; **Blömeke, Sigrid** (2021). Hva fremmer et innovativt miljø i skolen, og hvilken betydning har det for læreres undervisning?. I: Hva kan vi lære av TALIS 2018? Gode relasjoner som grunnlag for læring. *Cappelen Damm Akademisk*, pp. 35-55.

Philipsen, Brent; Tondeur, Jo; **Scherer, Ronny**; Pynoo, Bram; Zhu, Chang (2021). Measuring institutional support for online and blended learning professional development: validating an instrument that examines teachers' perceptions. *International Journal of Research & Method in Education*.

Qazi, Atika; Hasan, Najmul; Abayomi-Alli, Olusola; Hardaker, Glenn; **Scherer, Ronny**; Sarker, Yeahia; Kumar Paul, Sanjoy; Zubairu Maitama, Jaafar (2021). Gender differences in information and communication technology use & skills: a systematic review and meta-analysis. *Education and Information Technologies: Official Journal of the IFIP technical committee on Education*.

Reis Costa, Denise; Bolsinova, Maria; Tijmstra, Jesper; **Andersson, Björn** (2021). Improving the Precision of Ability Estimates Using Time-On-Task Variables: Insights From the PISA 2012 Computer-Based Assessment of Mathematics. *Frontiers in Psychology*; Volum 12.

Rutkowski, David; **Rutkowski, Leslie** (2021). Running the Wrong Race? The Case of PISA for Development. *Comparative Education Review*; Volum 65 (1), pp. 147-165.

Schauber, Stefan Kilian; Hautz, Stefanie C.; Kämmer, Juliane E.; Stroben, Fabian; Hautz, Wolf E. (2021). Do different response formats affect how test takers approach a clinical reasoning task? An experimental study on antecedents of diagnostic accuracy using a constructed response and a selected response format. *Advances in Health Sciences Education*; Volum 26, pp. 1339-1354.

Scherer, Ronny; Siddiq, Fazilat; Sánchez-Scherer, Bárbara (2021). Some Evidence on the Cognitive Benefits of Learning to Code. *Frontiers in Psychology*; Volum 12.

Senden, Bas; Nilsen, Trude; **Blömeke, Sigrid** (2021). Instructional Quality: A Review of Conceptualizations, Measurement Approaches, and Research Findings. I: *Ways of Analyzing Teaching Quality. Potentials and Pitfalls*. Universitetsforlaget, pp. 140-172.

Stahnke, Rebekka; **Blömeke, Sigrid** (2021). Novice and expert teachers' noticing of classroom management in whole-group and partner work activities: Evidence from teachers' gaze and identification of events. *Learning and Instruction*; Volum 74.

Stahnke, Rebekka; **Blömeke, Sigrid** (2021). Novice and expert teachers' situation-specific skills regarding classroom management: What do they perceive, interpret and suggest?. *Teaching and Teacher Education: An International Journal of Research and Studies*; Volum 98.

Stedal, Kristin; Broomfield, Catherine; Hay, Phillipa; Touyz, Stephen; **Scherer, Ronny** (2021). Neuropsychological functioning in adult anorexia nervosa: A meta-analysis. *Neuroscience and Biobehavioral Reviews*; Volum 130, pp.214-226.

Stedal, Kristin; **Scherer, Ronny**; Touyz, Stephen; Hay, Phillipa; Broomfield, Catherine (2021). Neuropsychological functioning in young anorexia nervosa: A meta-analysis. *Journal of Child Psychology and Psychiatry*, pp. 1-10.

Steinmann, Isa; Sanchez, Daniel; **van Laar, Saskia**; **Braeken, Johan**. The impact of inconsistent responders to mixed-worded scales on inferences in international large-scale assessments. *Assessment in education: Principles, Policy & Practice*.

Steinmann, Isa; Strietholt, Rolf; **Braeken, Johan** (2021). A Constrained Factor Mixture Analysis Model for Consistent and Inconsistent Respondents to Mixed-Worded Scales. *Psychological methods*.

Strello, Andrés; Strietholt, Rolf; **Steinmann, Isa**; Siepmann, Charlotte (2021). Early Tracking and Different Types of Inequalities in Achievement: Difference-in-Differences Evidence from 20 Years of Large-scale Assessments. *Educational Assessment, Evaluation and Accountability*; Volum 33. pp. 139-167.

Sun, Xiaojian; **Andersson, Björn**; Xin, Tao (2021). A New Method to Balance Measurement Accuracy and Attribute Coverage in Cognitive Diagnostic Computerized Adaptive Testing. *Applied Psychological Measurement*.

Tempelaar, Dirk; **Niculescu, Alexandra-Corina** (2021). Types of boredom and other learning activity emotions: A person-centred investigation of inter-individual data. *Motivation and Emotion*; Volum 46, pp. 84-99.

Teo, Timothy; Unwin, Siobhan; **Scherer, Ronny**; Gardiner, Veronica (2021). Initial teacher training for twenty-first century skills in the Fourth Industrial Revolution (IR 4.0): A scoping review. *Computers & Education*; Volum 170.

Torkildsen, Janne von Koss; Bratlie, Siri Steffensen; **Kristensen, Jarl Kleppe**; Gustafsson, Jan-Eric; Lyster, Solveig Alma Halaas; Snow, Catherine; Hulme, Charles; Mononen, Riikka; Næss, Kari-Anne Bottegård; Lopez-Pedersen, Anita; Wie, Ona Bø; Hagtvet, Bente Eriksen

(2021). App-based morphological training produces lasting effects on word knowledge in primary school children: A randomized controlled trial. *Journal of Educational Psychology*, pp. 1-23.

Van Laar, Saskia; Braeken, Johan (2021). Understanding the Comparative Fit Index: It's all about the base! *Practical Assessment, Research & Evaluation*; Volum 26 (26), pp. 1-25.

Veletic, Jelena; Olsen, Rolf Vegar (2021). Developing a shared cluster construct of instructional leadership. *Studies in Educational Evaluation*; Volum 68.

Veletic, Jelena; Olsen, Rolf Vegar (2021). Exploring school leadership profiles across the world: a cluster analysis approach to TALIS 2018. *International Journal of Leadership in Education*.

Ye, Wangbei; Wang, Zixuan; Zhang, Xuan; Ding, Yingying; **Ye, Wangqiong** (2021). Comparing motivations of pre-service and beginning teachers in China: impact of culture and experience. *Journal of Education for Teaching*; Volum 47 (4), pp. 576-589.

Ye, Wangbei; Zhu, Liping; **Ye, Wangqiong** (2021). Motivation and morality to manage a class: perceptions of homeroom teachers in China's Tianjin city. *Educational studies (Dorchester-on-Thames)*, pp. 1-19.

Ye, Wangqiong; Strietholt, Rolf; **Blömeke, Sigrid** (2021). Academic resilience: underlying norms and validity of definitions. *Educational Assessment, Evaluation and Accountability*; Volum 33 (1), pp. 169-202

Zhang, Maoxin; Andersson, Björn; Fang, Wang (2021). Are competitive people less altruistic and more manipulative? Associations among subtypes of competitiveness, hypothetical altruism, and Machiavellianism. *Personality and Individual Differences*; Volum 181.

External presentations and contributions

Andersson, Björn (5 October 2021) Presentation on "Estimation of longitudinal item response theory models with a second-order Laplace approximation", Seminar series in Statistics and Data Science, Department of Mathematics, University of Oslo

Andersson, Björn (28 October 2021) Presentation on "Efficient estimation of multidimensional multiple group item response theory models", October Gathering in Psychometrics, University of Oslo

Andersson, Björn (10 November 2021) Presentation on "Longitudinal Measurement Properties of the Montreal Cognitive Assessment", Gerontological Society of America Annual Scientific Meeting

Campos, G. Diego; Scherer, Ronny; Cheung, Mike (21 May 2021) Presentation on "Meta-Analyzing International Large-Scale Assessment Data: An Application of the Split, Analyze, and Meta-Analyze (SAM) Approach", Research Synthesis and Big Data Virtual Conference, ZPID, Germany

Campos, G. Diego; Scherer, Ronny; Cheung, Mike (17 November 2021) Presentation on “When Meta-analysis Meets International Large-scale Assessment Data: Applications of the Split, Analyze, and Meta-Analyze Approach”, 9th IEA International Research Conference

Costa, Denise Reis (2021) Presentation on “LOGANShiny: An app for illustrating process data analysis from international large-scale assessments”, Workshops at the International Conference on Educational Data Mining 2021. Online.
Proceedings available at: http://ceur-ws.org/Vol-3051/PA_2.pdf

Emslander, V., & Scherer, R. (20 May 2021) Presentation on “Linking Executive Functions and Math Intelligence in Preschool Children: A Meta-Analysis”, Research Synthesis & Big Data Virtual Conference, ZPID, Germany.

Emslander, V., & Scherer, R. (July 11 2021) Presentation on “Measuring Executive Functions and their Relation to Math Intelligence in Preschool Children: A Meta-Analysis”, ITC Colloquium (virtual).

Schneider, J., Backfisch, I., Lachner, A., Scheiter, K., & Scherer, R. (25 August 2021) Presentation on “Another jangle fallacy? Validity of Technological Pedagogical Content Knowledge self-reports”, Biannual meeting of the EARLI (virtual), Gothenburg, Sweden.

Talic, I., Scherer, R., Marsh, H., Greiff, S., Möller, J., & Niepel, C. (26 August 2021) Presentation on “Students’ lesson-to-lesson perceptions of the three basic dimensions of instructional quality”, Biannual meeting of the EARLI (virtual), Gothenburg, Sweden.

Howard, S., Tondeur, J., Scherer, R., & Siddiq, F. (26 August 2021) Presentation on “It’s here, are we ready? Exploring readiness for online teaching and implications for the future”, Biannual meeting of the EARLI (virtual), Gothenburg, Sweden.

Mittal, O., Scherer, R., & Nilsen, T. (7 September 2021) Presentation on “Measuring Socioeconomic Status across Ethnic Majority and Minorities in PISA 2018: Testing Household Possessions Index for Differential Item Functioning”, Annual meeting of the European Conference on Educational Research (virtual), Geneva, Switzerland.

Emslander, V., & Scherer, R. (15 September 2021). Presentation on “Meta-Analytic Structural Equation Models of Executive Functions and Math Intelligence in Preschool Children”, Annual meeting of the Fachgruppe Pädagogische Psychologie der Deutschen Gesellschaft für Psychologie (virtual), Heidelberg, Germany.

Lotz, C., Scherer, R., Greiff, S., & Sparfeldt, J. R. (16 September 2021) Presentation on “g’s kleine Helfer – VOTAT und NOTAT als Mediatoren zwischen Intelligenz und komplexem Problemlösen”, Annual meeting of the Fachgruppe Pädagogische Psychologie der Deutschen Gesellschaft für Psychologie (virtual), Heidelberg, Germany.

Emslander, V., Levy, J., Scherer, R., Brunner, M., & Fischbach, A. (19 September 2021) Presentation on “Stability of Value-Added Models: Comparing Classical and Machine Learning Approaches”, Annual meeting of the Fachgruppe Pädagogische Psychologie der Deutschen Gesellschaft für Psychologie (virtual), Heidelberg, Germany.

Emslander, V., Levy, J., Scherer, R., Brunner, M., & Fischbach, A. (10 November 2021) Presentation on “Stability of Primary School Value-Added Scores over Time: A Comparison Between Math and Language Achievement as Outcome Variables”, LuxERA Emerging Researchers’ Conference (virtual), Esch-sur-Alzette, Luxembourg.

Konstantinidou, E.-E., & Scherer, R. (16 November 2021) Presentation on “Teaching with technology: A large-scale, international, and multi-level study on the roles of teacher and school characteristics”, IEA International Research Conference, Dubai, UAE.

Campos, D. G., Scherer, R., & Cheung, M. W.-L. (17 November 2021) Presentation on “When meta-analysis meets international large-scale assessment data: Applications of the Split, Analyze, and Meta-Analyze approach”. IEA International Research Conference, Dubai, UAE.

Olsen, R. V. (1 June 2021) Presentation on “More than 25 years of international large-scale assessments (ILSAs): Lessons learned about mathematics education in the Nordic countries?”, Invited keynote lecture at The Ninth Nordic Conference on Mathematics Education (NORMA20), Oslo, Norway.

Scherer, R. (28 July 2021). Presentation on “Ready for the Great Online Transition? Teachers’ Technology Integration for Learning and Instruction”, Invited talk at the Hector-Institut für Empirische Bildungsforschung, Tübingen, Germany.

Strello, A., Strietholt, R., & Steinmann, I. (November 2021) Presentation on “The Effect of Between-school Tracking on School Segregation: International Evidence on Socioeconomic and Gender Segregation”, IEA International Research Conference (IEA IRC), Dubai, United Arab Emirates.

Steinmann, I. & Olsen, R. V. (November 2021) Presentation on “Equality of school effectiveness in the Nordic countries”, Nordic Educational Research Association (NERA) Annual Meeting, Odense, Denmark.

Steinmann, I. & Rutkowski, L. (May 2021) Presentation on “The Link between Gender Gaps in Secondary School Enrollment and Achievement”, College for Interdisciplinary Educational Research (CIDER) Spring Workshop 2021, digital conference.

Steinmann, I., Braeken, J., & Strietholt, R. (April 2021) Presentation on “Identifying Inconsistent Respondents to Mixed-Worded Scales in Large-Scale Assessments”, American Educational Research Association (AERA) Annual Meeting, digital conference.

Gladushyna, O., Strietholt, R., & Steinmann, I. (April 2021) Presentation on “Educational Gap Among Fourth Graders: Subject-Specific Strength and Weaknesses by Country, Gender, and Language Background”, American Educational Research Association (AERA) Annual Meeting, digital conference.

Steinmann, I. & Strietholt, R. (April 2021) Presentation on “Future Directions of Educational Measurement in International Large-Scale Assessments”, Symposium at the American Educational Research Association (AERA) Annual Meeting, digital conference.

Strietholt, R. & Steinmann, I. (April 2021) Presentation on “Unequal Opportunities and Unequal Outcomes: International Evidence”, Symposium at the American Educational Research Association (AERA) Annual Meeting, digital conference.





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