Editorial

The teaching of algebra has over the years descended from courses in higher education to become an integrated part of compulsory school education. Subsequently, the teaching and learning of algebra in the early grades has become an internationally established field of research (c.f. Cai & Knuth, 2011; Kieran, Pang, Schifter & Ng, 2016; Kaput, Carraher & Blanton, 2008). Also in the Nordic and Baltic region mathematics educators have developed an interest in this field. In this special issue, some of the recent Nordic research is presented. In the autumn of 2017 a call for papers was announced. It resulted in fourteen submitted papers, and finally the seven articles in this issue of NOMAD. Combined, they provide one picture of the contemporary research. In addition to this we would like to comment on other research in this field we are aware of. However, bear in mind, this is not a structured literature review. Our aim is merely to outline the millieu of this thematic issue. We mainly describe larger research groups and projects, and apologise in advance if we have omitted other important research.

Each of the submitted papers were reviewed by one or two of the other authors (internal review) and at least one external reviewer. The papers by the guest editors were manged by Johan Häggström in order to keep the review process blind. Some of the original papers were either rejected or withdrawn before or during the review process.

Finland

Research on the learning and teaching of algebra and pre-algebra has been scarce in Finland. Here we mention also research projects with some algebra-element, even if the main focus lies elsewhere.

The group of Erno Lehtinen at the University of Turku has studied early arithmetic at length but recently group members have also touched on skills related to algebra. Specifically, the concept of adaptive number knowledge relates in part to how knowledge from arithmetic can be used adaptively in more general algebraic settings (Brezovszky et al., 2019; McMullen et al., 2017). Similarly, studies on rational numbers (McMullen & Van Hoof, 2020; McMullen, Hannula-Sormunen & Lehtinen, 2017) touches on the transition from arithmetic to algebra. Rational numbers were also studies by Joutsenlahti, Perkkilä and Tossavainen (2016) (Finnish textbooks over two centuries) and Sifverberg and Tuominen (2015) (number-line and fractions).

An explicitly pre-algebra focused research effort has recently been started at the University of Lapland by Anna-Maija Partanen. Some of the first internationally available results of this group are presented in an article in this volume. Another quite recent effort at the University of Oulu is related to flexibility with a main focus on equation solving (see Hästö, Palkki, Tuomela & Star, 2019) and the contribution by Hästö and Palkki in this volume. On the note of advanced mathematics we also mention the contribution by Francisco and Hähkiöniemi (2012) on function machines.

Researchers at Åbo Academy University in Vasa have developed a research focus on algebra that grew from the early works of Ole Björkqvist. His group took part in the VIDEOMAT project together with researchers from Norway and Sweden (see Kilhamn and Röj-Lindberg in this issue). In recent years Kirsti Hemmi has brought new research interests to the group and initiated a Nordic network for algebra teaching described below.

Norway

Over the last five years, didactic studies with different approaches to algebra have been carried out in Norway. At Vestlandet University College, a PhD project has investigated how six mathematics textbooks for secondary school treat problem solving and algebra (Kongelf, 2019). Findings are discussed in light of the 2020 national curriculum and of Norwegian students' poor achievement on international tests such as PISA and TIMSS. Further, at the same institution, a theoretical study of how the n-th partial sum of a series can motivate students to work on algebra has been done (Myklebust, 2015).

Under the auspices of the University of Agder, a PhD study investigated how algebra was offered to a class at the beginning of upper secondary school (Espeland, 2017). Data are classroom observations, mathematics textbooks, students' solutions to algebra tasks, and interviews with students and the teacher. Findings show that the algebra content offered was focused on rules and algorithms with little or no connection to the underlying concepts. Further, at the University of Agder, a group of researchers took part in the VIDEOMAT project. They focused on two teachers' design of instructional examples used to help 8th grade students realize what algebra is all about (Wathne, Reinhardtsen, Borgersen & Cestari, 2019). Findings show how teachers' use of concrete objects and body movements can make introductory algebra accessible to students by linking students' observations of real world activities to school mathematics.

The project ARK&APP, a collaboration between the University of Oslo and Norwegian University of Life Sciences, contributes new research into how paper-based and digital educational resources are selected and used in Norwegian schools in multiple subjects. Three cases in algebra (grades 5–7, 8–10, and 11–13) investigated students' use of digital resources where oral explanations and mathematics language were at the centre (Dolonen & Kluge, 2014; Dolonen, Naalsund & Kluge, 2015; Naalsund, Dolonen & Kluge, 2015). Devices explored include Symbolenes verden, Bike Racing Math Algebra, Kikora, Dragonbox, Graph and GeoGebra.

In a project at the Arctic University of Norway, Tromsø, researchers and lower secondary school teachers have collaborated to investigate how ruvden (a round-shaped Sámi braiding) might give opportunities to teach discrete mathematics (Fyhn et al., 2015; Fyhn et al., 2017). Their findings show how investigations of ruvden may lead to transitions from numbers to variable and to combinatorics. On this basis, they argue that exploration of ruvden can stand on its own as a curricular activity for students who follow the Sámi curriculum.

At the Norwegian University of Science and Technology, didactic research on algebra centers on algebra as a modelling tool for phenomena that goes beyond algebra as a language for generalization (Strømskag, 2017a, 2017b). This research is carried out in teacher education using didactic engineering as a research methodology.

Sweden

In Sweden, research about algebra in the early grades has seen an increase in attention over the last decade. This may be related to the growing attention to early algebra in international research, as well as the fact that early algebra has made its way into the national curricula. Since the latest curricula reform in 2011, algebra is seen as a core content of mathematics right from the start in first grade.

In 2011, the VIDEOMAT project was launched at Gothenburg University, led by Professor Roger Säljö (Kilhamn & Säljö, 2019). The aim of the project is to discover hidden dimensions of teaching and learning in mathematics, by using video to document authentic classrooms and then using these videos as a point of departure for teacher focus group interviews. The content in focus for the project is the introduction of variables and symbolic algebra in grades 6 and 7. There is a comparative aspect of the project involving research groups and data from three Nordic countries: Sweden, Norway and Finland, as well as data from the USA serving as an outside contrast. Several doctoral students in Sweden and Norway have used data from the project in their theses (for example Nyman, 2017;

Rystedt, 2015, and two more upcoming), and a large number of articles have been published focusing on different aspects of these algebra lessons. For example Lundberg and Kilhamn (2018) described the transposition of knowledge in connection to a task about proportional reasoning, and Rystedt, Helenius and Kilhamn (2016) studied the role of context in student work. In this issue of NOMAD, the second phase, where teachers review and discuss their algebra lessons, is presented in an article by Kilhamn and Röj-Lindberg.

Another substantial project about early algebra was launched in 2016 by a group of researchers from Uppsala University, led by Professor Kirsti Hemmi (Hemmi et al, 2018). The title of the project is "Towards research-based teaching of algebra – diachronic and synchronic analyses of steering documents, curriculum materials and teachers' interaction with them". One of the main results so far is that generalized arithmetic is under-represented in the curriculum.

The recent introduction of programming as part of the core content of algebra at all grade levels in the Swedish national curricula sparked a research interest about the consequences of this connection. Kajsa Bråting from Uppsala University is the project leader for a new research project investigating the intersection of algebraic thinking and computational thinking (Kilhamn & Bråting, in press).

In Sweden there is an academic exam called licentiate, which is something halfway between a master and a doctoral exam. In 2013 the government instituted special career positions for school teachers with a licentiate exam. As a result, over the last five years a number of licentiate thesis have been produced. Many of these are reports on lesson or learning studies, and a number of them have investigated different aspects of algebra learning (e.g. Eriksson, 2015; Fred, 2019; Magnusson, 2014), in particular within the project "Developing algebraic reasoning capability" led by professor Inger Ericsson at Stockholm University. A topic of interest in these studies has been the use of the Davydov curriculum, also described in an article by Fred in this issue.

The variation theory group at Gothenburg University take a wider approach to teaching and learning, but does at times produce research with a specific focus on algebra, for example Häggström (2008) and Maunula (2018) who both focus on the teaching of linear equations.

Denmark and the Baltic countries

In Denmark, we can see a growing interest for research in early algebra teaching and learning. Several doctoral students are working on the topic (see e.g. Kaas in this issue), and there are also quite a lot of master theses addressing this topic. One recent study that can be seen as research

bridging early algebra into the more formal algebra needed in upper secondary school is the work, by Louise Meier Carlsen (2019), investigating the potentials and pitfalls of introducing CAS in lower secondary school.

To our knowledge there is not much research into primary mathematics in Estonia. There is however one group led by professor Eve Kikas at Tallin University. One of the groups' research interests is word problem solving skills of pupils in grade 1 to 6, but not specifically early algebra (see for example Pakarinen & Kikas, 2019). In Latvia and Lithuania the research is, to our knowledge, directed to more advanced mathematics.

Nordic algebra learning network

Nordic network for algebra learning, N^2AL, started in 2016 by researchers from Sweden and Finland interested in algebra learning. The purpose of the network is to develop collaboration by sharing ideas, exchanging experiences and taking part in joint research projects. The network members are doctoral students, as well as junior and senior researchers, from several universities in Sweden and Finland. The network has so far orga-nised five conferences on algebra learning. The network intends to hold at least one conference each year. There are also frequent informal meetings with the whole network or sub-groups of the network. The intention is to include all Nordic and Baltic researchers in this field into the network. More infromation can be provided by Kirsti Hemmi (kirsti.hemmi@abo.fi).

In this issue

This issue consists of seven articles. Four if them are written in English, two in Swedish and one is in Danish. The article from Denmark is put first, as it gives an introduction to the field. It is followed by two articles from Finland dealing with equation solving and variables. The three articles from Sweden are all related to the same research project, *Förmågan att föra och följa algebraiska resonemang – utmaningar för undervisningen i grundskolan och gymnasiet* [The ability to conduct and follow algebraic reasoning – challenges for teaching in primary and secondary education]. The final article has authors from Sweden and Finland.

The first article, *Tilgange til tidlig algebra*, is by Thomas Kaas. This article is a literature review written in Danish. Research about early algebra, published between 1995 and 2017, has been analysed and used to construct a framework describing different approaches to early algebra teaching. Differences between the different approaches primarily concern an emphasis on generalisations or on reasoning with unknowns, but also differences in the use of representations and contexts.

The second article is by Peter Hästö and Riikka Palkki and reports on a study of equation solving. The title of the article is *Finnish students' flexibility and its relation to speed and accuracy in equation solving*. The study examines the relation between different aspects of equation solving ability, more specifically if students' capacity and inclination for producing appropriate alternative, so-called innovative strategies, are related to students' speed and accuracy in solving equations. A test with 12 equations which allow for innovative, non-standard, strategies was used. The data consist of 257 tests by Finnish grade 8 and grade 11 students. The test data was analysed by a flexibility assessment's scoring manual. The findings suggest that students with high capacity for innovation show high speed and accuracy in solving equations, whereas inclination for innovation is not related to speed or accuracy.

The third article, *Developing a frame for analysing different meanings of the concept of variable mediated by tasks in elementary school mathematics textbooks*, is by Anna-Maija Partanen and Pieti Tolvanen. This article builds on ideas about the different roles that variables play, as describe by Usiskin already in 1988, and the different interpretations of variables found in research literature. A framework suitable for analysis of textbook tasks is constructed, tested and refined in the article. One aspect of the detailed framework is that the variable's roles are defined according to the context in which the variable appears.

The article *Materialisering av algebraiska uttryck i helklassdiskussioner med lärandemodeller som medierande redskap i årskurs 1 och 5*, by Inger Eriksson et al., draws on video data from a design research project based on Davydov's principles of learning activity, learning models and collective reflections. It describes and discusses how learning models in primary school (grades 1 and 5) can promote students' algebraic thinking. The analysis focuses on what conditions create whole-class discussions and how learning models have an impact on students' collective exploration of mathematical structures and relationships in algebraic expressions. Findings indicate that learning models as mediating tools are instrumental in students' reflective discussions on algebraic expressions. It is shown how the learning models enable students' "thinking in action" by materialisation of their thinking. Moreover, it is shown how the teacher's introduction of contradictions helps the students to validate their claims about algebraic relationships.

The fifth article, *Att designa för elevers deltagande i ett algebraiskt arbete –elever i årskurs 2 och 3 utforskar visuellt växande mönster,* by Jenny Fred, reports on a "learning study", aiming at refinement (in two steps) of the design of a lesson on algebraic generalisation of a shape pattern. It is related to and supplements Eriksson et al.'s study reported in this issue

in the way it focuses on task design. Data consists of planning documents and video-recordings of a sequence of three lessons with primary school students (grades 2 and 3). Findings point at conditions that are critical for students' expression and justification of structures in shape patterns, using algebra as a tool. On a more general level, the article indicates how didactic tools rooted in "learning activity" can be helpful in design and orchestration of classroom activities aiming at students' identification of critical aspects related to algebraic generalisation.

The article, *Algebraic thinking and level of generalisation: students' experiencing of comparisons of quantities*, by Helena Eriksson is conducted within the same project as the articles by Eriksson et al. and Fred in this issue. In her study, Eriksson use a phenomenographic analysis to investigate how grade 1 students experience comparisons of quantities after attending a learning activity using tasks from the Davydov curriculum. Algebraic thinking was identified as reflections on relationships between quantities at different levels of generalization, and was seen as the most advanced of the three ways of experiencing comparisions that the analysis showed.

The last article, *Algebra teachers' questions and quandaries – Swedish and Finnish algebra teachers discussing practice*, by Cecilia Kilhamn and Ann-Sofi Röj-Lindberg, reports on a study of what areas of knowledge teachers feel a need to develop when teaching algebra. The data consists of video-recorded teacher focus-group discussions within the VIDEOMAT project, an international research project about introductory algebra in grades 6 and 7. The focus-group discussions were structured around video episodes selected by the teachers themselves from their own classrooms. The analysis of the data reveals gaps in the participating teachers' own understanding of the mathematical content. The results imply that the ability to unpack a mathematical concept is essential in algebra teaching and that teachers may need external input concerning mathematical knowledge to enable development in pedagogical content knowledge.

Editors for this thematic issue of Nomad
Cecilia Kilhamn, University of Gothenburg (cecilia.kilhamn@gu.se)
Heidi Strømskag, Norwegian University of Science and Technology (heidi.stromskag@ntnu.no)
Peter Hästö, University of Turku (pealha@utu.fi)
Yvonne Liljekvist, Karlstad University (yvonne.liljekvist@kau.se)
Johan Häggström, University of Gothenburg (johan.haggstrom@ncm.gu.se)

References

Brezovszky, B., McMullen, J., Veermans, K., Hannula-Sormunen, M. M., Rodríguez-Aflecht, G. et al. (2019). Effects of a mathematics game-based learning environment on primary school students' adaptive number knowledge. *Computers and Education*, 128, 63–74. doi: 10.1016/j.compedu.2018.09.011

Bråting, K., Madej, L. & Hemmi, K. (2019). Development of algebraic thinking: opportunities offered in the Swedish curriculum and elementary mathematics textbooks. *Nordic Studies in Mathematics Education*, 24 (1), 27-49.

Cai, J. & Knuth, E. (Eds.). (2011). *Early algebraization. A global dialogue from multiple perspectives*. Berlin: Springer.

Carlsen, L. M. (2019). What algebraic knowledge may not be learned with CAS – a praxeological analysis of Faroese exam exercises. *Educação Matemática Pesquisa*, 21 (4), 85–99. doi: 10.23925/1983-3156.2019v21i4p085-099

Dolonen, J. A. & Kluge, A. (2014). *Læremidler og arbeidsformer for algebra i skolen – en casestudie i prosjektet ARK&APP, matematikk, 8. klasse* (Rapport nr. 4, ARK&APP). Retrieved from https://www.uv.uio.no/iped/forskning/prosjekter/ark-app/publikasjoner/downloads/rapport-4-case-matematikk-2014-04-11.pdf

Dolonen, J. A., Naalsund, M. & Kluge, A. (2015). *Læremidler og arbeidsformer i matematikk 1T vgs – en casestudie i prosjektet ARK&APP, matematikk 1T, studieforberedende utdanningsprogram, videregående skole* (Rapport nr. 7, ARK&APP). Retrieved from http://www.uv.uio.no/iped/forskning/prosjekter/ark-app/publikasjoner/downloads/Rapport_7_matematikk.pdf

Eriksson, H. (2015). *Rationella tal som tal. Algebraiska symboler och generella modeller som medierande redskap* (Licentiate thesis). Department of mathematics and science education, Stockholm University.

Espeland, H. (2017). *Algebra at the start of upper secondary school: a case study of a Norwegian classroom with emphasis on the relationship between the mathematics offered and the students' responses* (Doctoral dissertation). Kristiansand: University of Agder.

Francisco, J. M. & Hähkiöniemi, M. (2012). Students' ways of reasoning about nonlinear functions in guess-my-rule games. *International Journal of Science and Mathematics Education*, 10 (5), 1001–1021. doi: 10.1007/s10763-011-9310-3

Fred, J. (2019). *Att etablera och upprätthålla ett algebraiskt arbete i årskurs 2 och 3* (Licentiate thesis). Department of mathematics and science education, Stockholm university.

Fyhn, A. B., Jannok Nutti, Y., Dunfjeld, M. H., Eira, E. J. S., Steinfjell, A. S. et al. (2017). Can Sámi braiding constitute a basis for teaching discrete mathematics? Teachers and researchers' investigations. *Journal of Mathematics and Culture*, 11 (4), 1–38.

Fyhn, A. B., Jannok Nutti, Y., Dunfjeld, M. H., Eira, E. J. S., Børresen, T. et al. (2015). Ruvden as a basis for the teaching of mathematics: a Sámi mathematics teacher's experiences. In E. S. Huaman & B. Sriraman (Eds.), *Indigenous innovation. Universalities and peculiarities* (pp. 169–186). Rotterdam: Sense Publishers.

Hemmi, K., Bråting, K., Liljekvist, Y., Prytz, J., Madej, L. et al. (2018). Characterizing Swedish school algebra –initial findings from analyses of 299 steering documents, textbooks and teachers' discourses. In E. Norén, H. Palmér & A. Cooke (Eds.), *Nordic research in mathematics education, papers of NORMA 17* (pp. 299–308). Gothenburg: SMDF.

Häggström, J. (2008). *Teaching systems of linear equations in Sweden and China: What is made possible to learn?* (PhD thesis). Gothenburg: Acta Universitatis Gothoburgensis.

Hästö, P., Palkki, R., Tuomela, D. & Star, J. (2019). Relationship between mathematical flexibility and success in national examinations. *European Journal of Science and Mathematics Education*, 7 (1), 1–13.

Joutsenlahti, J., Perkkilä, P. & Tossavainen, T. (2016). Näytteitä murtoluvun käsitteestä eri aikakausien oppikirjoissa [On the concept of fraction in a sample of the Finnish mathematics textbooks from different era]. *FMSERA Journal*, 1 (1), 99–109. Retrieved from https://journal.fi/fmsera/article/view/60904

Kaput, J., Carraher, D. & Blanton, M., (Eds.). (2008). *Algebra in the early grades*. New York: Routledge.

Kieran, C., Pang J. S., Schifter, D. & Ng, S. F. (2016). *Early algebra: research into its nature, its learning, its teaching. ICME 13 topical surveys*. Hamburg: Springer Open.

Kilhamn, C. & Bråting, K. (in press). Algebraic thinking in the shadow of programming. In U. T. Jankvist, M. van den Heuvel-Panhuizen & M. Veldhuis (Eds.), *Proceedings of CERME11*. Utrecht: Freudenthal Group & Freudenthal Institute, Utrecht University and ERME.

Kilhamn, C. & Säljö R. (2019). *Encountering algebra. A comparative study of classrooms in Finland Norway, Sweden, and the USA*. Cham: Springer.

Kongelf, T. R. (2019). *Matematisk innhold og matematiske metoder i lærebøker brukt på ungdomstrinnet i Norge: gullgruve eller fallgruve for utvikling av matematisk kompetanse i problemløsning og algebra?* (PhD thesis). Kristiansand: University of Agder.

Lundberg, A. & Kilhamn, C. (2018). Transposition of knowledge: encountering proportionality in an algebra task. *International Journal of Science and Mathematics*, 16 (3), 559–579. doi: 10.1007/s10763-016-9781-3

Magnusson, J. (2014). *Proportionella samband – innehållets behandling och elevernas lärande* [Proportional reasoning – the relation between instruction and students learning] (Licentiate thesis). Faculty of Education, University of Gothenburg.

Maunula, T. (2018). *Students' and teachers' jointly constituted learning opportunities – the case of linear equations* (PhD thesis). Gothenburg: Acta Universitatis Gothoburgensis.

McMullen, J., Brezovszky, B., Hannula-Sormunen, M. M., Veermans, K., Rodríguez-Aflecht, G. et al., (2017). Adaptive number knowledge and its relation to arithmetic and pre-algebra knowledge. *Learning and Instruction*, 49, 178–187. doi: 10.1016/j.learninstruc.2017.02.001

McMullen, J., Hannula-Sormunen, M. M. & Lehtinen, E. (2017). Spontaneous focusing on quantitative relations as a predictor of rational number and algebra knowledge. *Contemporary Educational Psychology*, 51, 356–365. doi: 10.1016/j.cedpsych.2017.09.007

McMullen, J. & Van Hoof, J. (2020). The role of rational number density knowledge in mathematical development. *Learning and Instruction*, 65, art. no. 101228. doi: 10.1016/j.learninstruc.2019.101228

Myklebust, T. (2015). Kan rekka 1 + 2k + ... + nk motivere elevane til å arbeide med algebra? In F. O. Haara & I. K. Røe Ødegård (Eds.), *Grunnskolelærerutdanning gjennom pedagogisk entreprenørskap* (pp. 135–161). Oslo: Cappelen Damm Akademisk.

Naalsund, M., Dolonen, J. A. & Kluge, A. (2015). *Læremidler og arbeidsformer i algebra på mellomtrinnet – en casestudie i prosjektet ARK&APP, matematikk, 5. klasse* (Rapport nr. 12, ARK&APP). Retrieved from http://www.uv.uio.no/iped/forskning/prosjekter/ark-app/publikasjoner/downloads/rapport-11-mat-5-kl.pdf

Nyman, R. (2017). *Interest and engagement: perspectives on mathematics in the classroom* (PhD thesis). Gothenburg: Acta Universitatis Gothoburgensis.

Pakarinen, E. & Kikas, E. (2019). Child-centered and teacher-directed practices in relation to calculation and word problem solving skills. *Learning and Individual Differences*, 70, 76?85.

Rystedt, E. (2015). *Encountering algebraic letters, expressions and equations: a study of small group discussions in a grade 6 classroom* (Licentiate thesis). Faculty of Education, University of Gothenburg.

Rystedt, E., Helenius, O. & Kilhamn, C. (2016). Moving in and out of contexts in collaborative reasoning about equations. *The Journal of Mathematical Behavior*, 44, 50–64. doi: 10.1016/j.jmathb.2016.10.002

Silfverberg, H. & Tuominen, A. (2015). Murtoluvun ja lukusuorna pisteen välinen vastaavuus – tyyppillisimpiä virheitä luokanopettajaopiskelijoiden suorituksissa [The correspondence between fractions and points of the number-line – the most typical errors in pre-service elementary school teachers answers]. In H. Sifverberg & P. Hästö (Eds.), *Proceedings of the annual FMSERA symposium 2015* (pp. 133–142). Turku: Finnish Mathematics and Science Education Association.

Strømskag, H. (2017a). A methodology for instructional design in mathematics – with the generic and epistemic student at the centre. *ZDM*, 49, 909–921.
Strømskag, H. (2017b). Et miljø for algebraisk generalisering og dets innvirkning på studenters matematiske aktivitet. *Nordic Studies in Mathematics Education*, 22 (2), 71–91.
Wathne, U., Reinhardtsen, J., Borgersen, H. E. & Cestari, M. L. (2019). Designed examples as mediating tools: introductory algebra in two Norwegian grade 8 classrooms. In C. Kilhamn & R. Säljö (Eds.), *Encountering algebra: a comparative study of classrooms in Finland, Norway, Sweden, and the USA* (pp. 71–109). Cham: Springer.

Workshop for doctoral students

The editors of Nomad are planning for the ninth annual workshop for doctoral students to be held at NCM in Gothenburg, in May, 2020. More information and an invitation will be published on the Nomad website, http://ncm.gu.se/nomad-workshop

Madif-12

The twelfth research seminar in mathematics education, *Madif-12*, will take place in Växjö, January 14–15, 2020. The theme of the seminar is *Sustainable mathematics education in a digitalized world*. Two keynote speakers are invited, Professor Dame Celia Hoyles, University College London and Professor Paul Drijvers, Freudenthal Institute, Utrecht University and HU University of Applied Sciences, Utrecht. More information is available at http://matematikdidaktik.org

NORMA 20

The ninth Nordic conference on mathematics education, *NORMA 20*, will take place in Oslo, June 2–5, 2020. The conference is this time hosted by the University of Oslo. More information is available at https://www.uv.uio.no/ils/english/about/events/2020/norma/

Thanks to authors and reviewers

We wish to thank all authors for submitting papers to Nomad. We also wish to thank our reviewers, without whom neither this thematic issue nor the two regular issues of 2019 would have been possible at all. We are sincerely grateful to all for their continued engagement. Below we present a list of all reviewers of manuscripts for which a decision was made during 2019.

The Editors

List of reviewers

Andreas Obersteiner
Angelica Bikner Asheahs
Anita Valenta
Anna Ida Säfström
Anna-Maija Partanen
Arne Jakobsen
Arne Mogensen
Arthur Bakker
Attila Szabo
Barbro Grevholm
Björn Palmberg
Candia Morgan
Catarina Andersson
Dave Hewitt
Demetra Pitta-Pantazi
Elin Reikerås
Erhan Ertekin
Frode Rönning
Georgis Psycharis
Hanna Palmer
Helena Johansson
Hendrik van Steenbrugge
Ingi Heinesen Højsted
Irene Biza
Jake McMullen
Jan Olsson
Jani K. Hannula
Jeppe Skott
Johan Korhonen
Johanna Pejlare
Jónína Vala Kristinsdóttir
Jorma Joutsenlahti
Jorryt van Bommel
Kerstin Larsson
Kerstin Pettersson
Kjellrun Hauge
Kristina Juter
Kristín Bjarnadóttir
Lars Burman
Lena Lindenskov
Lisa Björklund Boistrup
Luis Radford
Madis Lepik
Magnus Österholm
Mario Sanchez
Martin Carlsen
Mette Andresen
Michael Shaughnessy
Minsung Kwon
Morten Misfeldt
Paola Valero
Per Nilsson
Per Sigurd Hundeland
Per-Eskil Persson
Raymond Bjuland
Reidar Mosvold
Riikka Mononen
Riikka Palkki
Rimma Nyman
Robert Gunnarsson
Rudolf Strässer
Sharada Gade
Sinead Breen
Sirkku Kupiainen
Thomas Kaas
Timo Tossavainen
Tinne Hoff Kjeldsen
Tuire Koponen
Uffe Thomas Jankvist
Vesire Hatisaru