LaUDiM is an intervention project developed in collaboration between researchers, teachers and leaders at two schools. The main goal is to develop deeper knowledge of the learning environment's significance for developing young learners' mathematical thinking and understanding, as well as to develop the ability to express mathematical concepts and ideas, orally and in writing. This also entails learners' ability to discuss mathematics, argue for and justify why something is right or not. Another goal is to develop the teachers' practice. A video-based design contributes to develop knowledge about video as a tool in teachers' learning. We also explore use of video in student teaching as part of strengthening future teachers' competence to lead productive mathematics conversations. Knowledge developed in the project will strengthen a research-based teacher education. The teachers conduct lessons planned in collaboration with researchers. Video recordings from the lessons and written student work was discussed and analyzed by teachers and researchers.

The project is presented at seminars and conferences for different target groups. For teachers, findings from a cycle on geometry were presented at LAMIS summer course 2016 and in *Bedre skole*, 3/2017. Reflections on how pupils develop language on multiplication and division were presented at Novemberkonferansen 2016.

At conferences in 2016, we presented findings showing that the pupils' everyday language is not always sufficient when introducing precise mathematical concepts. Later we have worked on questions related to pupils' collaboration and use of semiotic tools. We initiated a Nordic symposium at the conference NORMA17 on the topic "Perspectives on Young Children's Learning of Mathematics". In one of our presentations, theory about multiplicative structures was used to explain why pupils' solution strategies on two different combinatorial problems turned out so differently. The other presented three features of pupils' collaboration that stimulates mathematical progress: common goal; sharing their thinking; and involvement in each other's thinking. Mathematical progress depended on the ability to accompany verbal explanations with drawings. A continuation of this work, which additionally shows what hinders, is published in *Education 3-13, 2017*.

We are working on how the *Theory of Didactic Situations* (TDS) can contribute to understand teaching and learning of mathematics. Using data from planning and conduction of teaching about geometrical shapes and multiplicative structures, we have studied the *milieu* (as defined in TDS) that the pupils are operating on when solving mathematics tasks. This work is divided in two areas: One is linked to developing and using theory to study mathematics teaching, how can TDS be a useful tool to understand and develop mathematics teachers' practice? An important finding is how the concepts formulation and institutionalization give an understanding of a teaching sequence consisting of two lessons. This gives knowledge about how the analyzed sequence can be redesigned to strengthen the adidactical potential in the milieu. The other area focuses on which conditions in the milieu enable and which hinder pupils' learning of the intended target knowledge. Results from this were presented at CERME10.

LaUDiM is a knowledge-building project, and one of the researchers studies the developmental aspect in collaboration with a member of the reference group. Central in this work is how the different members of the project develop their thinking and practice, and how new knowledge is created. Preliminary findings were presented at PME 2017.

The PhD-student has, using theories from Brousseau and Steinbring, analyzed pupils' work with tasks and conversations with a teacher. Using TDS the role the material milieu plays for pupils' learning was analyzed. A paper was discussed at a PhD-seminar organized by NOMAD.

Analysis of post-lesson mentoring from the pre-service teachers' field practice shows that video helps the students to develop their role as interpreter of pupils' thinking so that the dialogue is informative for all pupils. This was presented at FINNUT-konferansen 2016 and has been extended to an international article. Analysis of the logs shows that the students found that video ensured that everyone remembers the situation in the same way, necessary for good reflection and discussion. Video-supported mentoring is experienced as more instructive and concrete than mentoring without video. This was presented at Veilederkonferansen 2017. On a research stay in Australia, one of the researchers used software for coding on video to analyze the students whole class dialogues. Preliminary analysis shows that it is demanding to involve many pupils in the conversations. The dialogues tend to be teacher-led when trying to make pupils' strategies available to the entire class.

Presentations are available on www.laudim.no.