Sub-Saharan Africa is currently undergoing an education crisis with over 32 million out-of-school children, and over 80% of school-enrolled children not meeting minimum proficiency in math and reading assessments. Students from rural areas are disproportionately affected by these issues as it is difficult to recruit and maintain high quality teachers in rural schools. Interested organizations and governments have attempted to tackle this issue by introducing mobile educational technologies to supplement, and sometimes replace traditional classroom education when adults are unavailable. The success of these initiatives require that children support one another in these technology-based learning environments. Collaborative peer learning leads to increased test scores, cognitive activity, motivation and enthusiasm, and satisfaction over individualized learning settings.

To begin this thesis, I conducted two research studies to understand how peers support each other in rural, low-resource contexts in Tanzania. In the first study, I deployed a tablet-based educational technology in different social contexts; in school and at home, in the presence or absence of adults, with shared or individual tablets, and in the presence or absence of other knowledgeable children. I found that students needed three types of support to successfully engage with the tablet-based learning technology: digital literacy support, application specific support, and domain knowledge support. While peers provided support primarily by modeling correct behavior, they did not collaborate at all in the presence of a teacher. Following these results, I conducted an experimental study where I assigned and trained group leaders to provide adequate peer support while learning with technology. I found that group leaders provided adequate and persistent support only when there is public knowledge of who they are, and a social expectation of help-giving from their peers. Results from this experimental study showed that with adequate knowledge and training, peers can provide support for each other in this cultural context.

To complete my thesis, I will explore the design of a system intervention that fosters more equitable helping and collaborative student behaviors. It is a rule-based struggle detection system that automatically detects the kind of support that a student needs and offers them suggestions to seek help from another student in the group who has mastered that task. I will conduct an experimental study in a school located in a rural village in Tanzania over a three-week period, using mixed methods approaches to understand differences in students’ helping behavior, their interaction patterns and performance differences on the learning device, as well as any changes in their classroom behavior as a result of the increased collaboration between group members during the experimental sessions. This thesis contributes to research on applying learning science principles in understudied contexts, designing feedback mechanisms for learning systems, and understanding the effects of teaching students such behaviors on normal student-student, and student-teacher interactions.