Advancing quality in education in the primary and lower secondary schools of Ethiopia and south Sudan

BDU-NORHED Project planning and launching workshop report

Date: December 14 – 17, 2016

Venue: Bahir Dar, Ethiopia

Compiled by
Meskerem Lechissa Debele (PhD)
Dawit Asrat Getahun (PhD)
Dawit Tibebe Tiruneh (PhD)
Project Overview

Project Duration: 5-years (3rd August 2016 – 30th August 2021)

Project Partners: Bahir Dar University, BDU (Ethiopia) – the Agreement Partner, University of Juba, UJ (South Sudan), and Norwegian University of Science and Technology, NTNU (Norway).

Funding: The project is supported by the Norwegian Agency for Development Cooperation (NORAD).

The project aims at building institutional capacity of BDU and UJ to improve the quality of Science and Mathematics education in primary and lower secondary schools. The project will have three components: Education, Research, and Institutional Capacity Building. The education component will develop workforce (of which 50% will be females) relevant to STEM undergraduate and Postgraduate programmes at BDU & UJ.

The project aims to launch two Master’s programs enrolling 80 students. It will also involve student and staff-exchange programs to train 12 PhD (8 from BDU and 4 from UJ) and 2 Post-Doc students at NTNU and BDU in STEM education.

Three joint research projects will be undertaken with the aim of infusing core practices around STEM education and gender-responsive pedagogy in science and mathematics teachers’ practices. The project will also work to enhance the STEM leadership capacity of University Management; equip the institutions’ STEM incubation centers, and develop ICT-based pedagogical and database support systems.

Project Implementation Structure: the project will be implemented through two forms of partnerships. The first one is the partnership between BDU, NTNU and UJ. In this partnership, NTNU will engage with BDU and UJ in providing PHD and Master educations as well as in conducting collaborative research projects. The second partnership is between BDU and 14 Colleges of Teacher Education (CTEs) – 10 CTEs from Amhara Regional State and 4 CTEs from the four marginalized regions in Ethiopia. The following figure depicts the structure of the partnerships in the project.
Aim of the launching workshop

The purposes of the project launching meeting were:
- To clearly acquaint the project aim to the higher officials of Bahir Dar University
- To review project activities and budgets for successful implementation of the project after clearly spelling out how and when we expect to undertake particular activities and critically looking at the submitted budget and the work-plan
Day 1: December 14, 2016
Time: 2:30 pm
Venue: Bahir Dar, Bahir Dar University, at the President’s Meeting Room

The first day of the workshop was held at the President’s meeting room at Bahir Dar University. Invited guests, regional and national media personnel, as well as project team members arrived at the meeting room starting from 2:00pm. The following are the participants during the first day of the launching workshop.

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Responsibility/position</th>
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<tbody>
<tr>
<td>1.</td>
<td>Dr. Baylie Damte</td>
<td>President, BDU</td>
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<td>2.</td>
<td>Dr. Fikreselam Gared</td>
<td>Vice-president for Strategic Communications, BDU</td>
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<td>3.</td>
<td>Dr. Matebe Tafere</td>
<td>Academic Vice-president of BDU</td>
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<td>4.</td>
<td>Dr. Jørund Aasetre</td>
<td>Faculty of Teacher and Interpreter Education¹, NTNU</td>
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<td>5.</td>
<td>Dr. Charlotte Nakakaawa</td>
<td>Faculty of Teacher and Interpreter Education, NTNU</td>
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<td>6.</td>
<td>Dr. Solomon Abedom</td>
<td>Faculty of Teacher and Interpreter Education, NTNU</td>
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<td>7.</td>
<td>Mr. Moges Abhra</td>
<td>Director for External Relations and Partnership Directorate, BDU</td>
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<td>8.</td>
<td>Dr. Wassie Anteneh</td>
<td>Research Director, BDU</td>
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<td>9.</td>
<td>Dr. Yesahmbel</td>
<td>Entrepreneurship director, BDU</td>
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<td>10.</td>
<td>Dr. Birhanu Assaye</td>
<td>Vice-president for administrative affairs, BDU</td>
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<td>11.</td>
<td>Mr. Abiy Menkir</td>
<td>Community Services Director, BDU</td>
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<td>12.</td>
<td>Dr. Fantahun Biadgelegn</td>
<td>Project office Director, BDU</td>
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<td>13.</td>
<td>Dr. Andargachew Moges</td>
<td>Dean, College of Education and Behavioral Sciences, BDU</td>
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<td>14.</td>
<td>Dr. Dawit Asrat Getahun</td>
<td>Project Coordinator and Director of the Institute of Pedagogical and Educational Research (IPER), BDU</td>
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<td>15.</td>
<td>Dr. Dawit Tibebu</td>
<td>Member of IPER</td>
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<td>16.</td>
<td>Mr. Haftu Hindeya</td>
<td>Project team member and member of IPER, BDU</td>
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<td>17.</td>
<td>Dr. Meskerem Lechissa</td>
<td>Project team member and member of IPER, BDU</td>
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<td>18.</td>
<td>Mr. Ahmed Yebrrie</td>
<td>Project team member and member of IPER, BDU</td>
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<td>19.</td>
<td>MR. Berie Gete</td>
<td>Project team member and director of the BDU/STEM center</td>
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<td>20.</td>
<td>Dr. Amare Sahile</td>
<td>Member of IPER</td>
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<tr>
<td>21.</td>
<td>Mr. Endayehu Tegegn</td>
<td>V/Dean, College of Education and Behavioral Sciences, BDU</td>
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<tr>
<td>22.</td>
<td>Mr. Koye Kassa</td>
<td>Research and community services coordinator, CEBS, BDU</td>
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¹ Now Department of Teacher Education, Faculty of Social and Educational Science
In addition, local media agencies (Amhara TV and Ethiopian Broadcasting Corporation) attended the first day of the launching workshop.

After the invited guests arrive at the setting, the coordinator of the project on BDU’s side, Dr. Dawit Asrat welcomed the guests and explained the purpose of the workshop. In his speech, he noted that the workshop marks the official launching of the project and that the project team from NTNU, JU, and BDU would work in the next three days on technical issues for successful implementation of the project. After introducing the day’s program, he invited the participants to introduce themselves to the audience. After self-introductions are completed, Dr. Dawit invited Dr. Baylie Damtie to make a welcoming remark. In his welcoming remark, Dr. Baylie emphasized the immense significance of the project at this particular time when Bahir Dar University is aspiring to become one of the top ten premier research universities in Africa by 2025. Dr. Baylie expressed his gratitude to all members of the project of the partner institutions, and vowed to support for the successful completion of the project.

Following the welcoming remark by Dr. Baylie, Dr. Charlotte presented an overview of NORHED administrative procedures and expectations. She highlighted the themes (programs) of financial support by NORHED. So far there were two phases of support. The focus of the second phase, which instigated the project being launched at BDU, was on education and training and aims at improving quality of education in primary and secondary schools in LMIC. The particular focuses of NORHED phase 2 were:

- Education and research (Joint research projects)
- Literacy and numeracy
- Pedagogy
- Master Programmes, PhD studies & Post Doc Fellowships
- Academic collaboration partnerships (S-S & S-N)
- Partnerships with public and private sector

Dr. Charlotte remarked that NORHED requires projects to be gender responsive (in terms of equality in student and staff recruitment & project coordination), to integrate gender issues in education programs (curriculum) and research, and to set clear targets and budgets. Partnership building/networking (strengthening existing partnerships and collaborations), human rights and environment and sustainability are other crosscutting issues NORHED set to be addressed in projects. There is zero tolerance for corruption. There needs to be clear
procedure for selection of students who will pursue their studies with the support of the project.

Dr. Charlotte described some of the specific issues that need to be taken into consideration in NORAD supported projects:

1. **Need for Institutionalizing the NORHED project**

   NORHED needs projects to be institutionalized. The aim behind this is to secure project outcome sustainability when NORAD funding ends, to ensure **value for money** and **efficiency** through joint project management (auditing and internal M&E) and implementation at institutional level (esp. those with many projects), to create/Identify avenues for harnessing synergies, and to secure project ownership beyond the team.

2. **Preferred Education/Training model**

   In terms of education programs which will be started as part of projects, NORAD prefers registration and awarding of degrees in the South partners. However, there are exceptions for students to be registered and awarded degrees at the North partner if there are convincing justifications such lack of programme in the south or lack laboratory materials. In this case, there should be plans to develop necessary programme in the south. The common arrangement of education programs is using sandwich model. There will be joint recruitment of students and if students register at Norwegian Institution, minimum requirements at the Norwegian institution apply.

3. **Annual project planning and review**

   The purposes of annual project planning and review are to:
   - Review project progress to ensure that activities result into intended outputs/outcomes
   - Plan for incoming year
   - Identify project risks and potential mitigation strategies
   - Review budget (Past and incoming year – Disbursed vs Actual expenditures).

   In this case revisions should **not exceed 15%** in budget line. Revisions exceeding 15% will require justification and approval from NORAD

   The participants of annual project planning and review are project team members and if possible PhD students. The review will be held at an agreed upon time by the participants.
4. Financial Management
In order to adhere to NORAD’s Zero tolerance for corruption and ensure value for money, a continuous internal auditing (by the project team throughout the project period) annual based external auditing (based on partner procedures) are required. The participants of the auditing need to be project coordinators, institutional accounting officers, internal and external auditors.

5. Project Monitoring and Evaluation
Project monitoring and evaluation will be conducted based on NORAD’s Results Based Management (RBM) framework. It will be conducted according to the Project Results Framework (or logframe). Linkages between activities-outputs-outcomes-impacts will be examined. There are internal and external project monitoring and evaluations. The internal monitoring and evaluation will be conducted throughout project implementation period by partner institutions. The external monitoring and evaluation will be conducted by NORAD at mid and end terms of the project. Dr. Charlotte noted that the details on the focus of monitoring and evaluation are available from NORAD’s website.

6. Project Reporting
The overall responsibility of project reporting goes to the agreement Partner (BDU) but all partners have shared responsibility. At mid-year, partners will report to the agreement partner. The reporting needs to be narrative and financial. The deadline for reporting will be according to the dates in agreements between the grand recipient and NORAD as well as between the grand recipient and the partners. Dr. Charlotte finally indicated the following points as possible way forwards for proper project management:

• Establish Project Steering and Management Committee (PSMC) with representation from all partner institutions
• Complete Project logframe (With clear baselines timelines and deliverables – See example and Norad Evaluations of On-going projects for clarity)
• Conduct Annual Project Planning Meeting,
• Establish Project Monitoring and Evaluation Plan
• Establish Project Communication and Dissemination Strategy

Finally, Dr. Charlotte remarked that every member of the project team should be well acquainted with NORAD project policies and guidelines.
Following Dr. Charlotte’s presentation, Dr. Jørund presented about the project background and overview from the NTNU’s perspective. He started his presentation by providing an overview of the Norwegian University of Science and Technology (NTNU). He noted that:

- NTNU has as its mission “Knowledge for a better world” and creates solutions that can change our daily lives.
- In 2016, NTNU merged with the University Colleges in Gjøvik, Sør-Trøndelag and Ålesund to form a single university. The merger gives the university more comprehensive course offerings and larger research groups. NTNU is now Norway’s largest, most exciting and innovative university.
- NTNU’s interdisciplinary research results in innovations that have great economic and social significance.
- NTNU also has the broadest study offerings of any Norwegian university in the different technological and artistic and aesthetic disciplines.

Dr. Jørund highlighted about the social mission, the values, overarching goals, organization (budget, staff, and program of studies), research areas, research and industry linkage as well as innovations at NTNU. He also briefed the participants about the Faculty of Teacher and Interpreter Education, which is the specific partner for the present project. He explained about the faculty’s structure, research, study programs, and major projects.

After giving the highlights about NTNU in general and the Faculty of Teacher and Interpreter education in particular, Dr. Jørund presented about the research needs planned to be addressed through the project from NTNU’s perspective. According to him, it is essential to start the process of matching people and topics in the project. The general intention of research projects (particularly that of PhD projects) are categorized into three

- Project 1: focus on mathematics didactics. The proposed plan under this project is that there will be 6 PhD + 1 Post Doc candidates
- Project 2: natural science didactics. Here there will be 4 PhD + 1 Post Doc candidates
- Project 3: Teaching Environmental Geography. Under this project there will be 2 PhD candidates.

It was generally described that the overall organization of the project will have the following structure:
However, Dr. Jørund remarked that interests and initiatives at present stage will have some possibilities to influence research direction. Research projects are planned to use schools and teacher training colleges as ‘laboratories’ for research. In other words, since the purpose of the project at large is to bring about quality in science and mathematics education, the research activities should mainly be school-based and focus on improving science and mathematics teaching and learning practices.

Following, Dr. Jørund’s presentation, the project background and overview from the BDU’s perspective was presented by Dr. Dawit Asrat. Dr. Dawit started by introducing the team members who developed the project (from both the NTNU and BDU’s side) and acknowledging them for the superior efforts they rendered to make the application successful. Dr. Dawit presented the key areas that NORHED aims at strengthening Higher Education Institutions:

- Education and training
- Health
- Natural resource management, climate change and environment
- Democratic and economic governance
- Humanities, culture, media and communication
- Capacity development in South Sudan
He explained that education and training was the priority in the 2016 call and the particular focus of the call was *quality improvement for primary and lower secondary education*. The countries which were eligible for the call were *Ethiopia*, Haiti, Malawi, Nepal, Niger and *South Sudan*.

Dr. Dawit explained that the idea of focusing on the improvement of quality in education (particularly on that of science and mathematics education) as part of the project emanated from national and global demands. At the national level, the emphasis placed on science and technology in Ethiopia’s growth and transformations plans (GTP I & GTP II), the nation’s vision of becoming a middle income country by 2025, the declining student achievement in the science disciplines, low teacher quality, and lack of research outputs in students’ science and mathematics learning in primary and lower secondary levels were the rationales to start the project. Furthermore, the global importance of advancement in science and technology as the key for competitiveness and national progress was another reason for the project to focus on the education of science and mathematics.

On his presentation Dr. Dawit emphasized that the project will be undertaken by the partnership between Bahir Dar University (BDU), Norwegian University of Science and Technology (NTNU), and the University of Juba (UJ). In this partnership, NTNU will engage with BDU and UJ in the provision of Post-doc, PhD and Master education as well as in conducting collaborative research projects. Besides, BDU will have partnership with 14 Colleges of Teacher Education (CTEs) – 10 CTEs from Amhara Regional State and 4 CTEs from the four marginalized regions in Ethiopia – from which the MED candidates will mainly be recruited.

In terms of the scope of the project in enhancing education programs and capacity building, it is noted that two new Master’s programs (MED in Mathematics Education and MED in Science Education) will be launched and there is a plan to teach 80 (66 from Ethiopia, and 14 from South Sudan) candidates. By launching a PhD program in educational sciences (with streams of mathematics education, science education, and environmental science education) 12 candidates (8 from Ethiopia and 4 from South Sudan) will be trained. Furthermore, two staff from BDU will pursue post-doc studies (possibly spending half of the time at BDU and the other half at NTNU). The project will address 14 colleges of teacher education in Ethiopia, each of which is linked to 5 primary schools. Besides, BDU has a link with five lower secondary schools. Hence, a total of 75 schools will be within the sight of the project.
Short term trainings will be provided for 440 primary and lower secondary school teachers in Amhara region focusing of STEM and gender sensitive pedagogy. After the presentation, Dr. Baylie forwarded his some over all questions to the project team. He asked whether it is really essential for someone who has a good mastery of a subject matter to get training in education. The team members (Dr. Charlotte & Dr. Solomon) explained that the necessity of training in education is so as to help subject matter experts be skilled in the how of teaching specific subject matter issues. It was remarked that knowing algebra and knowing how to teach algebra are not the same. Hence, the main objective of the project is to capacitate those who have the subject matter mastery on the how of teaching their subject matter.

With this, the day’s program was completed and the project team members met to plan the tasks for the next day.

Here is the link for of the news of the event in the first day
https://www.youtube.com/watch?v=RNm1YMNlxC8

Pictures from the first day of the launching workshop
BDU-NORHED Project Lunching Workshop

Day 2: December 15, 2016
Time: 9:00am
Venue: Jakaranda Hotel, Bahir Dar

Participants:
- Mr. Ahmed Yibrie
- Mr. Berie Gete
- Dr. Andargachew Moges
- Mr. Endayehu Tegegne
- Dr. Dawit Asrat
- Dr. Dawit Tibebu
- Dr. Jørund Aasetre
- Dr. Charlotte Nakakaawa
- Dr. Solomon Abedom
- Dr. Amare Sahile
- Mr. Feyissa Mulisa
- Dr. Meskerem Lechissa

Session I: PhD training needs at BDU

- Tentative plans of PhD research projects by potential PhD candidates were presented by Mr. Ahmed Yibrie. Mr Ahmed began by introducing the profiles of the candidates, followed by their possible dissertation research topics:
  - Dereje Taye – “Enhancing primary school teachers’ mathematical pedagogical content knowledge /PCK/”
  - Ahmed Yibrie- “designing learning environments to foster science teachers’ pedagogical content knowledge /PCK/ on data use to improve student learning outcome” or
    - “Integrated STEM education in primary/secondary education in Ethiopia”
  - Haftu Hindeya - “Representation of higher order thinking skills in secondary school science curricula”
- Berie Gete – “Integrating manipulatives in the elementary mathematics classrooms in Ethiopia (technology-enhanced mathematics learning environments)”

- Following the presentations, participants raised different issues concerning the proposed PhD candidates and research areas.
  - Dr. Jørund noted that NTNU has its own standards for selection of candidates, and the procedures are strict. In addition, NORHED requires the PhD announcement to be open, so that they know that it is free of corruption or other unnecessary influences.

- The question “why should PhD candidates need to go to NTNU?” was raised and discussed by participants:
  - Dr. Solomon reminded the group that there are three options –
    - Registration of PhD candidates at BDU,
    - Sandwich model in which, as originally planned, students will be enrolled at BDU, but go for 7 months or so to Norway to take courses, or
    - Registration at NTNU
  - Dr. Charlotte said that it is possible for two or three core staff to be fully registered at NTNU. But, there is a need of written justification to be submitted to NORHED project officer. For example, the fact that there is no relevant PhD program on STEM integration in BDU that the students can be enrolled at, and the fact that even if the curriculum is going to be developed, it will still be a new program, can be written a justification. Dr. Solomon noted that the reason for the requirement is that NORHED is skeptical candidates will go back to their home institution after the completion of their study, and that will be against the original plan to build institutional capacity.
  - Dr. Jørund - in addition, salary compensation for NTNU professors applies if the students are going to take courses here and NTNU professors are going to supervise their work here in Ethiopia. Otherwise, this doesn’t apply, and there should be budget revision.

Conclusion- we don’t have relevant program here, and we don’t have experience of STEM integration locally that are exemplary for the candidates to work from. They need some exposure outside. But their research projects will mainly be done here. They need to have some exposure, and perhaps, even take courses and do field observations to other universities
in Norway which have well developed STEM integration post-graduate programs. This should be written to the program coordinator at NORHED.

- The other issue raised was whether NTNU is committed to provide a joint degree if the sandwich model is applied.
  - Dr. Solomon explained that there are universities in Norway which grant degrees jointly with other universities. However, the team from NTNU will check this.

Coffee break

Session II: Needs assessment preparation at the Teacher Training Colleges:

Dr. Dawit Asrat presented the plans for needs assessment to be done through interview and focus group discussion. According to Dr. Dawit, the participants planned to be involved in the interview and FGDs include deans and vice deans at the College of Education and Behavioral Sciences of BDU and at selected Colleges of Teacher Education (CTEs) at Amhara Region, heads of the departments of Psychology and Curriculum and Instruction at BDU, heads of the departments of science and mathematics sections at CTEs, officials and subject area experts (science and mathematics) at Amhara Regional State Education Bureau, and former graduates of Masters programs in physics and mathematics.

Dr. Dawit distributed the questions planned for the interviews and FGDs (See in the appendix) and asked the participants to forward their comments. Clarifications and discussions were made among participants regarding:

- **Structure** – how is BDU actually interlinked with the Regional Education Bureau, with the primary schools, with the secondary schools? Who is responsible to train teachers from primary schools and secondary schools?
  - Clarification was given to the team from NTNU on the above question.

- **The need assessment instrument** - will be shared to all so that they can make additions they think are necessary
  - Also, more detail of the context should be added into it in order to make it understandable to all.
As an additional issue, the need of developing the project website is raised and it was remarked that the educational structure, as well as the project flow, should be sketched in a diagram and posted.

**Lunch Break**

**Session III: Areas of research and capacity development training needs**

In the first session after lunch break, Dr. Meskerem presented BDU’s areas of research and capacity development training needs—two of the three components of the project. She highlighted that BDU’s priorities to become one of the top ten research universities in Africa by 2015 and to strengthen educational quality and excellence in research and outreach services are both in line with the project’s emphasis on research and capacity building.

BDU’s role in the capacity development will mainly be to coordinate field research for students and to initiate the design of collaborative research. The major target of research in the project can be understood as improving quality in Science and Math learning in primary and lower secondary schools in Ethiopia and South Sudan. The specific targets of the project include:

- Developing children’s basic literacy, numeracy, and environmental awareness
- Tackling with inefficiency indicators such as drop out, repetition, and non-completion, and
- Alleviating low quality indicators

In the presentation, the different indicators of teachers’ skill gaps were highlighted, such as lack of subject matter mastery, lack of pedagogical content knowledge, primarily teacher-centered learning environment, and absence of active student learning, inquiry processes, meta-cognitive skill development or opportunities for creativity. The project’s significance in light of the changing demands on teacher education programs was also discussed in the presentation. Mainly, the 70:30 quota policy has increased the demand for high quality teacher education programs that integrate research and practice to produce competent teachers. The push on teacher education programs to model and integrate innovative pedagogical approaches to ensure instructional capacity of student-teachers has also increased. In addition, there is stronger need to make school-based continuous
professional development programs grounded in empirical inquiry and reflective practices as well as integrative of innovative pedagogies pertinent to STEM and use of ICT.

The project’s role in addressing the gender gap was another issue raised in Dr. Meskerem’s presentation. Different gaps such as lower achievement of female girls in science and math, low female student enrollment in STEM fields, lower number of science and mathematics teachers in schools, and lower number of teacher educators in STEM-related fields require conscious and continuous efforts in increasing female participation in STEM disciplines, mainstream gender issues into the [STEM] curricula, giving due consideration to the specific learning needs of girls, and integrating gender-responsive pedagogy in teacher education.

Dr. Meskerem presented several themes that could be taken up in the different collaborative research in the project. These include:

- Situating STEM education with the communities’ contexts (e.g., economic activities)
- Integrating minority perspectives in STEM fields
- Student-centered learning models suitable for STEM education
- Computer-assisted classroom lessons and activities
- Training for teachers on various approaches of instructional designs that best support STEM integration
- School cultures (hidden curriculum) that promote/impede STEM learning
- Improving female students’ attitude and achievement in STEM subjects
- Goal-setting approaches that positively impact pupils’ motivation to learn STEM subjects
- Improving teachers’ ability to tap into students’ multiple intelligence and peculiar interests to get them hooked to STEM subjects
- Updating and enriching obsolete contents from science and math curricula
- Designing extra-curricular activities that support STEM integration
- Scientific literacy in day to day life and how that can be integrated with classroom STEM learning
- Outdoor activities
- Interdisciplinary instructions on persistence, resilience, and problem-solving disposition
- Enhancing the roles of school leadership in STEM integration in schools, and
Mainstreaming gender issues in science and Math education

The 75 schools linked with the 14 CTEs and BDU were understood to be the major research sites for these research projects. They will be realized through final projects of Masters and PhD students from BDU partner colleges which will be conducted in collaboration with STEM teachers in the schools, joint research projects that will be funded in the project, short-term tailor made trainings on innovative and gender responsive pedagogies, and opportunities created when female students from partner schools participate in summer STEM camps at BDU. The major role players in research will be the 12 PhD candidates of the project, the 2 post-doc candidates, and research teams and research network created among BDU, NTNU, and UJ staff. Female candidates and staff will be encouraged to participate in and lead research teams. The outputs of the research will be communicated via peer reviewed journals and presentations at national and international conferences.

Capacity Development Training Needs
Increasing the administrative and management skills of the concerned academic, administrative, and financial leaders of BDU was also one of the topics brought up for discussion by Dr. Meskerem. It is planned that 10 leaders (6 from BDU and ANRSEB) and 4 from UJ (50% females) will conduct exchange visits and receive training programs on institutional management, human resource development, resource and project management, and STEM education leadership, etc.

Other trainings that will be given emphasis in the project are tailor-made capacity training to project students on leadership, technology use, writing skills, and data analysis. In addition, every year beginning year II, training on STEM education and Gender Responsive Pedagogy will be given to 110 school teachers, a total of which will be 440 by the end of the five project years.

Other aspect of the capacity development will be during the establishment of science museum. Developing online support and knowledge database for primary and secondary school teachers and teacher educators, creating network of female school teachers, graduate students and teacher educators, and creating gender responsive learning environment will be the priorities in this regard.
Project Outputs:
Dr. Meskerem highlighted that during the life time of the project, a total of 2 electronic books, 20-25 journal articles, 2 conference proceedings (year III & V), and 2 STEM teaching handbooks for use in schools (1 for primary and 1 for lower secondary schools) will be produced.

Financial Allocations for PhD & Research
About 44.24% of the total project fund will be devoted to PhD & Research, most of which will be spent in Norway for Ethiopian PhD & Post Doc, South Sudanese PhD fellows, and other staff, as salary compensation to Norwegian supervisors, for 2 joint research projects each year, beginning second year, and for travel and accommodation of 5 national and 2 international conference presentation for PhD and Post-Doc fellows each year.

Project Research Sustainability
Dr. Meskerem highlighted that the project research sustainability will be ensured through the development and undertaking of other similar research projects, provision of training, and consultancy services.

Questions and comments from participants:

1. The participants from NTNU indicated that possible postdoc research projects are not sufficiently discussed during the presentation: Who are the potential candidates? Are they going to be part of the program? Should they choose one research area and conduct the research or should the topics be integrated with the PhD projects? When would be the right time to start the post-doc projects?

Participants discussed on these questions and agreed that:

- Post-doc studies should rather be planned sometime around the end of the project (2019 is suggested).
- Post-doc candidates should better engage in directing the research agenda and setting up future research themes.
- One participant suggested that it would be possible and more useful to integrate master’s thesis projects with PhDs and postdoc research projects.
2. Participants from BDU asked about what the experience is at NTNU regarding post-docs. Do post-doc researchers have ‘dedicated’ supervisors? Do they usually come up with their own research project?
   o Participants from NTNU explained that postdocs don’t necessarily have supervisors, but mentors whom they may contact periodically. The postdocs are supposed to plan and guide their research activities by themselves…

3. One participant has suggested that the PhD/postdoc candidates may consider working on “ethno-mathematics.” For example, why is it that people from one area/region of the country in Ethiopia good at Mathematics? This was suggested as one potential research topic during the project life cycle.

Coffee Break

Session IV: Research Needs and Directions at NTNU

After coffee break, Dr. Jørund presented about research directions at NTNU and the intention on the part of NTNU on the PhD projects. According to Dr. Jørund, they intended to have three focal areas for the PhD projects:

- Project 1: focus on mathematics didactics (6 PhD + 1 Post Doc)
- Project 2: natural science didactics (4 PhD + 1 Post Doc)
- Project 3: Teaching Environmental Geography (2 PhD)

However, as Dr. Jørund remarked, there can be more negotiation on the projects proposed.
BDU-NORHED Project Lunching Workshop

Day 3: December 16, 2016
Time: 3:00am
Venue: Jakaranda Hotel, Bahir Dar

Participants:

- Mr. Ahmed Yibrie
- Mr. Berie Gete
- Dr. Dawit Asrat
- Dr. Dawit Tibebu
- Dr. Jørund Aasetre
- Dr. Charlotte Nakakaawa
- Dr. Solomon Abedom
- Dr. Amare Sahile
- Mr. Feyissa Mulisa
- Dr. Meskerem Lechissa

Session 1: Discussion on Masters & PhD Curriculum Development at BDU

Dr. Solomon – did a presentation on some examples of master’s degree programs in Mathematics, science, and environmental geography education.

E.g., they don’t necessarily take Geometry, higher mathematics, algebra, etc. Rather they take courses like Mathematics I, Mathematics II, etc. These courses are not the pure mathematics, but how to teach that mathematics (at grades 1-7; or 5-10). They don’t involve higher level mathematics. While describing the general feature of the masters programs, Dr. Solomon added that the programs are very much practice-oriented; students frequently go out for practice. Beginning from the bachelor’s, it is a five year program. The difference is, the teacher education programs at NTNU directly teach the teachers who will work at primary or secondary schools, whereas this project will target teacher educators at the Colleges of Teacher Education.

In relation to this, Dr. Charlotte raised the question that if BDU, through the master’s program, is going to educate the trainers of teachers who teach at the CTEs, then should the
approach be the same with teaching directly the would-be-teachers as the University colleges in Norway do?

**Dr. Solomon** – It is much better if it is the same. The educators of future elementary school teachers should be taught as if they would be the teachers themselves. The participants generally agreed on this.

**Dr. Jørund** – presented ideas for different alternative ways of organizing masters programs, as is practiced in NTNU. He presented the example of the planned integrated Master program for would-be teachers at primary schools.

Participants also discussed that there may be overlap between the two M.Ed programs (science and mathematics education) since they may take several common courses such as: general instructional principles, research methods, etc..

**Coffee break**

**Session II: Sample PhD curriculum at BDU**

Dr. Dawit Asrat presented the existing PhD curriculum in Educational psychology at Bahir Dar University. He explained about the structure of the program. According to him, the PhD program has two streams – developmental psychology and learning & instruction. Students in both streams will commonly take 8 core courses (3 of them are PhD seminar courses in which students will be guided towards their dissertation work). In addition, they are required to take three elective courses (two of which need to be related to the stream of their interest). The total credit hour required from a student is 27 (that is equivalent to 432 contact hours). This does not include the time a student spends for independent study. However, the new legislation of BDU requires the total credit hours for course provision for a PhD program to be between 12-24 credit hours. Dr. Dawit remarked that this needs to be considered in the development of the PhD program. The following points are raised during the discussion after the presentation:

- Credit hour systems need to be understood in order to decide what implication the 12-24 credit hour course work per PhD program range legislated at BDU meets with the around 30 credit points per semester requirement at NTNU
- Difference of tradition in course arrangement (for eg. Norwegian courses tend to be bulky; in Ethiopian PhD program, the courses are more specific and narrow)
- Different options of the final dissertations (papers vs monograph) should be left to the individual
- Some of the courses (more general courses that apply to all PhD students) should be given here, so that when they come to Norway, they focus on those that are not here
- There may be a need to push the program beginning time for PhD and masters students (from September 2017 to January 2018)

After this, assignment of members for the development of the curricula is conducted as follows:

<table>
<thead>
<tr>
<th>1. Overall coordinators</th>
<th>2. Environmental science</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Dr. Jørund</td>
<td>a. Dr. Jorund</td>
</tr>
<tr>
<td>b. Dr. Charlotte</td>
<td>b. Dr. Meskerem</td>
</tr>
<tr>
<td>c. Dr. Meskerem</td>
<td>c. Mr. Ahmed Yebrrie</td>
</tr>
<tr>
<td>d. Dr. Dawit A</td>
<td>d. Dr. Amare Sahile</td>
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<td></td>
<td>e. Mr. Feyisa Mulissa</td>
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<tr>
<td>3. Mathematics didactics</td>
<td>4. Natural science didactics</td>
</tr>
<tr>
<td>a. Dr. Solomon Abedom</td>
<td>a. Dr. Ranghild</td>
</tr>
<tr>
<td>b. Professor Geir Botten</td>
<td>b. Dr. Helena</td>
</tr>
<tr>
<td>c. Dr. Ole Enge</td>
<td>c. Dr. Tsegaye Kassa</td>
</tr>
<tr>
<td>d. Ms. Kirsti Rø (PhD fellow)</td>
<td>d. Dr. Dawit Tibebu</td>
</tr>
<tr>
<td>e. Dr. Gurju Awgechew</td>
<td>e. Mr. Haftu Hindeya</td>
</tr>
<tr>
<td>f. Mr. Berie Gete</td>
<td>f. Mr. Ahmed Yebe</td>
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<tr>
<td>g. Mr. Dereje Taye</td>
<td>g. Dr. Mengesha</td>
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<td></td>
<td>h. Mr. Zinaye Tefera</td>
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</table>

**Lunch Break**

**Session III: Revisiting the project log-frame and implementation plan**

The project team members have gone through the project log-frame and implementation plan. Some lines of the start and end date of the implementation plan were changed due to the overall delay of the time of start of the project. Some of the major changes that are made include

Curriculum development: March 2017 – June 2017
Review and validation of the program: July 2017 – Sep 2017
Recruitment and registration of the candidates for masters October 2017 - December 2017
Launching master’s program (actually enrolling the first cohort of Master’s program students) – January 2018
In addition to doing the baseline assessment and needs assessment, we need to invite CTEs and REBs to be part of the curriculum development workshop and the review process of the workshop.
Finally, as Mr. Kennedy Galla (The project coordinator from the University of Juba side) was not able to come to Bahir Dar due to visa issues, the participants agreed that he needs to come to Bahir Dar and briefed about everything.
BDU-NORHED Project Launching Workshop

Day 4: December 17, 2016
Time: 3:00am

This was the last date of the launching workshop and the activities done were:

- Visit to the Bahir Dar Stem Incubation Center
- Lake Tana Excursion

Some of the pictures taken are the following
Appendix A

Interview and FGD items for Needs assessment to launch MED in science and mathematics education (Revised after the workshop)

1. **Questions for Focus Group Discussion at College of Education and Behavioral Sciences, Bahir Dar University (Participants: dean of the college, vice-dean of the college, head of the department of psychology, head of the department of curriculum and instruction)**

1. Higher education in Ethiopia has been reformed over the past decade in response to the need for improved skills development, particularly in STEM education. The recently adopted policy of 70/30 enrolment ratio in favor of STEM is a case in point. What have been the contributions of the College so far in supporting the successful implementation of this policy (e.g., preparing students and teachers in STEM fields?)

2. What do you think are the major successes and challenges concerning STEM education in the Ethiopian education system?

3. What is the college’s plan to expand academic programs particularly in science and mathematics education, or subject area teaching in general?
   - Recruitment of subject area methodology staff
   - Establishment of academic units
   - Number of teachers who have subject area teaching specializations
   - Collaboration with other colleges and academic units

4. How do you see the need of launching MED in science and mathematics education?
   - Relevance to country priorities
   - The capacity (e.g., staff, resources, etc.) the college has
   - If launched, commitment of the college to sustain the programs after the project (what exit strategies can you suggest?)

5. What do you suggest the program to include in terms of professional and subject area course mix?
2. **Questions for Focus Group Discussion at Amhara Reginal State Education Bureau.**

There will be two FGDs here:

**FGD 1 participants:** head of the bureau, vice-head of the bureau, coordinator of the Colleges of Teacher Education

**FGD 2 participants:** science and mathematics teaching experts

1. Higher education in Ethiopia has been reformed over the past decade in response to the need for improved skills development, particularly in STEM education. The recently adopted policy of 70/30 enrolment ratio in favor of STEM is a case in point. What have been the contributions of the office so far in supporting the successful implementation of this policy at the school level? (e.g., preparing students and teachers in STEM fields?)

2. What are the major successes and challenges concerning STEM education in the region’s education system?

3. How do you evaluate science and mathematics teachers’ competence, in primary and secondary schools?

4. How do you see the current professional upgrading of preparatory school teachers’ through summer programs to Masters Degree in science disciplines? What do you think about the effectiveness of the program in preparing the teachers to be good science teachers (subject area mastery + pedagogical knowledge)?

5. If your assessment of primary and secondary school teachers’ competence (in effectively implementing the current 70/30 higher education) is not so positive,
   a. What kind of competence would you suggest teachers to possess?
   b. What kind of competence would you suggest teacher educators working in CTEs to possess

6. What roles do you think you will have if BDU launches MED in science and mathematics education?
   - Commitment to select, and give study leave for candidates from CTE, primary, and secondary schools?
   - Commitment to collaborate with BDU in conducting researches that involve designing and implementing instructional interventions in regular sessions?

7. How do you evaluate the science and mathematics expertise of your staff? For instance, to what extent the profile of science and mathematics experts in the bureau matches with the roles and responsibilities of the job?
• I was wondering if there are continuous opportunities for your experts to attend (short-term/long-term) trainings that may bridge some of their knowledge gaps?

• Would you say the Bureau has the commitment and plan to train science and mathematics experts if they don’t meet the required standard?

8. How do you see the need of launching MED in science and mathematics education at BDU?
   • Relevance to the country’s and the region’s priorities

9. What do you suggest the program to include in terms of professional and subject area course mix?
3. **Questions for Focus Group Discussion at Amhara Reginal State Colleges of Teacher Education (Participants: college dean, college vice-dean, science education section head, mathematics education section head)**

1. What do you think are the major successes of your college in its effort to produce competent science and mathematics primary school teachers for the region?

2. How do you describe the challenges faced by science and mathematics teacher educators in your college in terms of training competent primary school teachers?
   - In terms of their training background
   - In terms of their pedagogical skills

3. How much the profile of science and mathematics teacher educators in your college matches with their roles and responsibilities?
   - Commitment to train science and mathematics teacher educators within the college if they don’t meet the required standard

4. I assume you may have some information about the competence of your students when they graduate in the various disciplines.
   - How do you evaluate, for example, the subject matter knowledge of those would be primary school science and mathematics teachers when they graduate?
   - How do you evaluate their pedagogical knowledge?
   - How do you evaluate their pedagogical content knowledge?

5. How do you evaluate the teacher educators’ competence in helping the teacher trainees integrate mathematics and science subjects with other subjects and school activities?

6. What is the College’s plan to train teacher educators particularly in science and mathematics education, or subject area teaching?

7. How do you see the need of launching MED in science and mathematics education at BDU?
   - Relevance to country priorities

8. What roles do you think you will have if BDU launches MED in science and mathematics education?
   - Commitment to select, and give study leave for candidates from CTE, primary, and secondary schools
   - Research collaboration (action research)?

9. What do you suggest the program to include in terms of professional and subject area course mix?
4. **Interview items for staff at Colleges of Teacher Education who hold MED in science or mathematics teaching from earlier programs at different universities**

a) How do you describe the challenges faced by science and mathematics teacher educators in your college in terms of training competent primary school teachers?
   - In terms of their training background
   - In terms of their pedagogical skills

b) What limitations did you see as part of your MED training?

c) How do you see the need of launching MED in science and mathematics education at BDU?
   - Relevance to country priorities

d) What improvements do you suggest to be made in MED programs in science/mathematics teaching? What do you suggest the program to include in terms of professional and subject area course mix?
Appendix B

Workshop Schedule (initial)

Advancing Quality in Education in the Primary and Lower Secondary Schools in Ethiopia and South Sudan

Project planning & launching meeting, Bahir Dar University (BDU), Bahir Dar, Ethiopia

14th to 17th December 2016, Venue: Bahir Dar

The Project will hold its Project Planning and launching meeting at Bahir Dar University, Ethiopia, between 14th and 18th December, 2016.

Registration for the meeting will be on Wednesday, 14th December, 2016, with the programme commencing after lunch on the same day. The meeting will conclude on the afternoon of Saturday 17, 2016. The Project Team will meet to agree on the way forward.

Based on the understanding that NTNU, BDU, UJ and the teacher training colleges will collaborate in conducting research and student supervision, obtaining a clear understanding of the research and training needs and interests of the different partners will be pertinent right from the beginning. This will be instrumental in establishing collaborative research projects which are relevant (in terms of capacity building in the South) and of interest to all partners in the project.

In addition, since BDU has plans of developing new Masters and PhD curricula – to which project Masters and PhD students will be enrolled, if this process is already underway, it will be informative to get an overview of what has been done so far and any future plans. This will enable partners to plan on how and when to engage with other project partners and the necessary inputs/resources.

The purpose of the project planning and launching meeting is normally to review project activities, budgets and performance in the previous year. However, we have not got into the implementation, and it is hoped that this meeting will give us the opportunity to clearly spell out how and when we expect to undertake particular activities and to critically look at our submitted budget and the work-plan. Often, there is an opportunity to submit a revised budget and work-plan after the meeting.
<table>
<thead>
<tr>
<th>Time</th>
<th>Agenda</th>
<th>Responsible person</th>
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<tbody>
<tr>
<td>13:30-14:00</td>
<td>Arrival and registration of participants</td>
<td>All</td>
</tr>
<tr>
<td>14:00 - 14:20</td>
<td>Self-Introductions</td>
<td>All</td>
</tr>
<tr>
<td>14:20 - 14:30</td>
<td>Welcome remarks</td>
<td>Dr. Dawit &amp; Dr. Baylie (BDU President)</td>
</tr>
<tr>
<td>14:30 – 15:00</td>
<td>Overview of NORHERD Administrative Procedures &amp; Expectations</td>
<td>Dr. Charlotte Nakakaawa</td>
</tr>
<tr>
<td>15:00 - 15:30</td>
<td>Project Background and Overview (NTNU Perspective)</td>
<td>Dr. Jørund &amp; Dr. Solomon</td>
</tr>
<tr>
<td>15:30 - 16:00</td>
<td>Project Background and Overview (BDU/UJ Perspective)</td>
<td>Dr. Dawit Asrat Getahun</td>
</tr>
<tr>
<td>16:00 - 16:30</td>
<td>Coffee/tea break</td>
<td>Staff Lounge</td>
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<tr>
<td>16:30 – 17:00</td>
<td>planning for Day 2</td>
<td>Project team members</td>
</tr>
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### Day 2: THURSDAY, 15th DECEMBER, 2016

**Venue: Jakaranda Hotel**

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>09:00 – 09:10</td>
<td>Remarks on the project from the college dean</td>
<td>Dr. Andargachew</td>
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<tr>
<td>09:10 - 09:40</td>
<td>PhD Training Needs BDU</td>
<td>Ahmed/Haftu/Berie/Dereje</td>
</tr>
<tr>
<td>09:40 - 10:00</td>
<td>Need Assessment Preparation at Teacher Training Colleges</td>
<td>Dr. Dawit Asrat</td>
</tr>
<tr>
<td>10:00 – 11:00</td>
<td>Discussions</td>
<td>All</td>
</tr>
<tr>
<td>11:00 – 11:30</td>
<td>Coffee/tea break</td>
<td>Jakaranda Hotel</td>
</tr>
<tr>
<td>11:30 – 12:00</td>
<td>Training Needs University of Juba</td>
<td>KENNEDY C. GALLA</td>
</tr>
<tr>
<td>12:00 – 12:30</td>
<td>Discussions</td>
<td>All</td>
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<tr>
<td>12:30 – 14:00</td>
<td>Lunch break</td>
<td>Jakaranda Hotel</td>
</tr>
<tr>
<td>14:00 – 15:00</td>
<td>Areas of research and capacity development training needs at BDU</td>
<td>Dr. Dawit/Dr. Meskerem</td>
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<tr>
<td>15:00 – 15:30</td>
<td>Discussions</td>
<td>All</td>
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<tr>
<td>15:30 – 15:45</td>
<td>Coffee/tea break</td>
<td>Jakaranda Hotel</td>
</tr>
<tr>
<td>15:45 – 16:05</td>
<td>Research needs/directions/interests at UJ</td>
<td>Kennedy</td>
</tr>
<tr>
<td>16:05 – 16:20</td>
<td>Discussions</td>
<td>All</td>
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<tr>
<td>16:20 – 17:05</td>
<td>Research needs/directions/interests at NTNU</td>
<td>Jørund/Solomon</td>
</tr>
<tr>
<td>17:05 – 17:35</td>
<td>Discussions</td>
<td>All</td>
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### Day 3: FRIDAY, 16th DECEMBER, 2016

**Venue: Jakaranda Hotel**

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<tbody>
<tr>
<td>9:00 – 10:30</td>
<td>Project team &amp; guests</td>
<td>Project team &amp; guests</td>
</tr>
<tr>
<td>10:30 – 11:00</td>
<td>Coffee/tea break</td>
<td>Jakaranda Hotel</td>
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<tr>
<td>11:00 -12:30</td>
<td>Discussion on Masters &amp; PhD Curriculum Development at BDU</td>
<td>Project team</td>
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<tr>
<td>12:30 -13:30</td>
<td>Lunch break</td>
<td>Jakaranda Hotel</td>
</tr>
<tr>
<td>13:30 – 14:00</td>
<td>The Budget (Project resources – funds and time)</td>
<td>Dr. Solomon</td>
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<tr>
<td>14:00 – 14:30</td>
<td>Discussion</td>
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<tr>
<td>14:30 – 15:00</td>
<td>Coffee/tea break</td>
<td>Jakaranda Hotel</td>
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<tr>
<td>15:00 -16:00</td>
<td>Project Team Meeting – Revised Annual Budget 2017</td>
<td>Dr. Dawit/Dr. Jørund</td>
</tr>
<tr>
<td>16:00 – 16:30</td>
<td>Wrap up and way forward</td>
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### Day 4: SATURDAY, 17th DECEMBER, 2016

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<th>Time</th>
<th>Agenda</th>
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</thead>
<tbody>
<tr>
<td>8:30 – 10:00</td>
<td>Visit to STEM Center</td>
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<tr>
<td>10:30 – 12:30</td>
<td>Excursions (Lake Tana)</td>
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</tr>
<tr>
<td>12:00 – 13:30</td>
<td>Lunch</td>
<td>Jakaranda Hotel</td>
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