Bahir Dar University

Outreach Program for Talented Students Project

Report (May 2013 – Nov. 2013)

Financed by: Gelfand Family Charitable Trust (GFCT)

"Inside Every Child is a Scientist" G.M.

Bahir Dar STEM Incubation Center Building

Bahir Dar University

Outreach Program for Talented Students Project

Report *(*May 2013 – Sep 2013)

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Bahir Dar University

Bahir Dar, Ethiopia

Contents

1. Preplanning and Preparation

1.1. Laboratory Manual and Rooms Preparation

During the 2011/12 academic year the laboratory manuals were prepared based on:

1. The grade of the students: *course syllabus has been studied.*
2. Their background knowledge: *we have also assessed the practical skills that are being given in the schools of Bahir Dar town.*
3. Expected skill and knowledge: *we outlined the expected skills and knowledge that enhances the talents of the students.*

The manuals have been prepared for grades 7&8, 9&10 and 11&12 by team of professionals. The manuals consist of theoretical background and practical work in the laboratory and projects which are constructed by the students. They were prepared based on the capacity of the students, and the objectives of the program.

From the experiences we obtained during the 2012 academic year summer outreach program, we understood that the manuals still need further improvement and revision. So, in 2013 academic year an open letter was distributed to university academic community and based on the criteria set by the outreach program coordinating group, six senior staff members were selected from each program. Based on the signed contract agreement, the revision work was finalized at the end of June, 2013. Seventeen laboratory manuals were revised and compiled for the program. They are complete, up to the standard and clear so that participants haven't faced difficulties to understand and implement the practical exercises throughout the manual.

The laboratory rooms for Science, Mathematics, ICT and Electronics were identified and cleaned, the laboratory setups were prepared, and the materials were selected and made available for use during the month of June 2013 thus the environment was made suitable to school students. Physics and Chemistry laboratory for group 1 (Grades 7&8 students) were arranged in class rooms which were not used for the same purpose before. This year, mathematics laboratory were arranged for all groups of students (Grades 7-12). The software's we used for this purpose were 'Microsoft Mathematics', '3D graph' and mainly

'Geogebra'. **Geogebra** is a free mathematical software which is interactive and simple to use in demonstrating all school mathematics concepts, both algebra, and geometry.

In general six laboratory rooms in science, three class rooms for mathematics and four laboratories for ICT were arranged. In addition, in Engineering campus two electronics and four computer laboratories has been dedicated for this program for the whole summer.

Laboratory equipments supplied by **Mr. Mark Gelfand** were arrived in the beginning of June, 2013 and they were arranged and used in physics and electronics laboratories.

1.2. Student and Teacher Selection

1.2.1 Students Selection

The 2013 participant students were selected in two different ways:

i. **Students selected by the ministry of education:**

These students are selected by Amhara and Benshangul Gumuz Region Educational Bureaus. The criteria they used for the selection are the club activities, creativity and average mark of the student in science and mathematics subjects. **300** students were selected from Bahir Dar City and East- Gojjam Administrative zone and **150** students were selected from Benshangul Gumuz Region.

ii. **Students Selected by Bahir Dar university:**

- **a.** The university accepted **16** students from the 2012 participant students. These students showed special effort and talent to work on projects and defend their work during the 2012/13 school year. They are among the 45 selected students during 2012 summer outreach program.
- **b.** The university gave chance to accept students from 16 non-governmental schools in Bahir Dar city. They are **40** in number and equal numbers of students were selected from each school.
- **c.** The university again accepted **45** students from the university staffs. To select the students from the university staff, we used students' average result of science and mathematics subjects.

1.2.2. Teacher Selection

a. School Teachers Selection

School teachers were selected based on the activity of each teacher on Science and Technology clubs in their schools. Each school had one science and technology coordinator and four or five unit leaders. Based on the selection criteria, about seven mathematics teachers, six physics teachers, six chemistry teachers, six biology teachers and four ICT teachers were selected in collaboration with Bahir Dar City education office.

b. University Instructors and Laboratory Technicians Selection

The university Instructors were selected based on a pre-noticed criteria so that those instructors who have experience in writing laboratory manuals and participated in school students training were targeted. Thus, a total of **20** instructors, 4 from mathematics and ICT, 3 from physics, chemistry, biology and electronics were part of the program. Applying the same criteria **21** laboratory technicians from science, ICT, electronics and mathematics were in the program.

		Grades 7-8	Grades 9-10	Grades 11-12	Total
Number of students	Male	69	83	166	480
	Female	43	45	74	
Number of University Instructors		5	6	9	20
Number of School Teachers		10	10	9	29
Number of Laboratory Technicians		6	7	8	21

Table 1: Number of participant students and teachers in each group

1.3. Registration and Orientation

1.3.1. Registration

Registration of students from Amhara region, Benshangul Gumuz region and 16 non-governmental schools in Bahir Dar City was performed from July 14 to July 15, 2013. During this time **435** students were registered. Registration of **45** students selected from university community family was held in July 16, 2013. Dormitory and food services for students coming from outside Bahir Dar City were provided starting from July 14, 2012.

Actual Summer Teaching Program was started in July 17, 2013.

1.3.2. Orientation

In July 16, 2013, discussion was held between participant instructors from Bahir Dar University and school teachers about the objectives of the outreach program and its implementation together with participants' role and responsibilities in the summer training program.

In the same day, July 16, 2013, a discussion was held between all registered students about the program particularly about: the general objectives of the outreach program, the 2013 summer outreach program, the working principles that we must follow for effective implementation of the program, students' roles and responsibilities in the summer program, transportation system, class schedules, dormitory and cafeteria rules etc. Uniform (T-shirt) and stationary materials were provided for registered students during this time.

Sections students are assigned, laboratory rooms, school and university instructor teams assigned, learning sessions, etc are well informed to students in July 16, 2013.

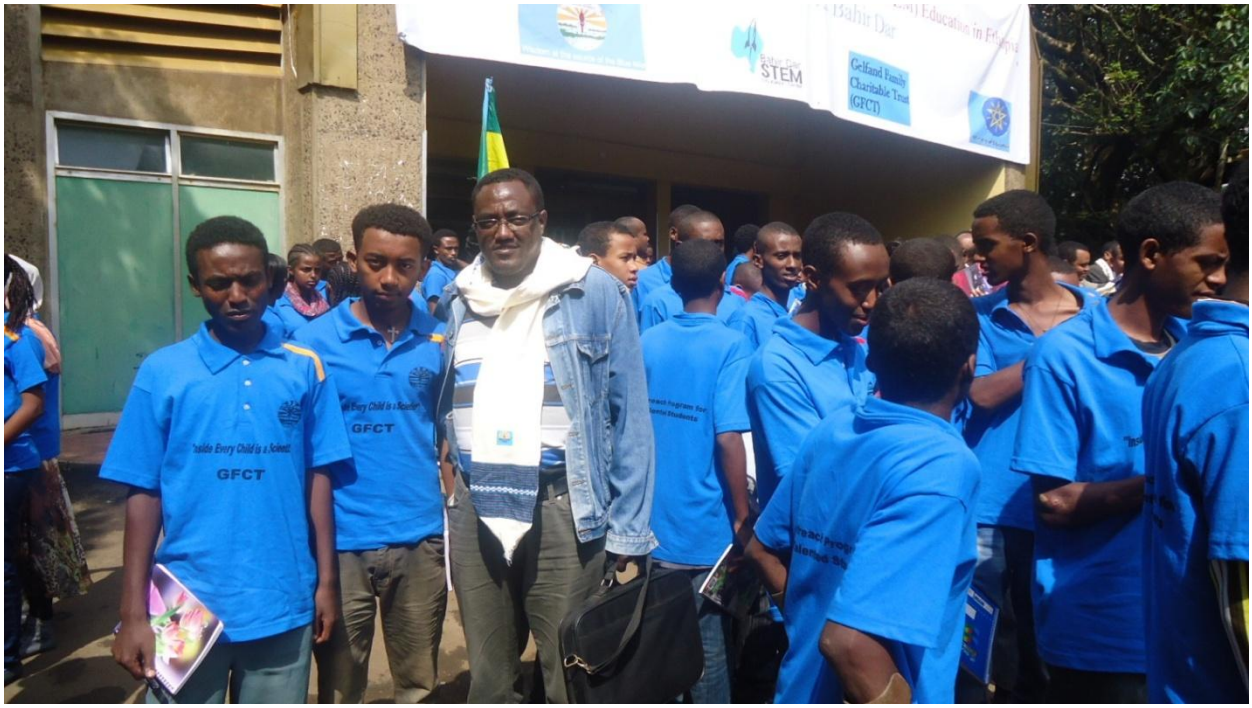

Figure 1: Students during the orientation time

2. Training Delivery

2.1. The Summer Training Program Structure

The whole students are grouped according to the following:

- **Group 1:** which includes Grades 7 and 8
- **Group 2:** which includes Grades 9 and 10 and
- **Group 3:** which includes Grades 11 and 12

Group 1 and 2 students were placed into 4 sections and group 3 students were placed into 8 sections. Each section of all levels contains 30 students.

Group 1 students took the training on 5 subject areas: Mathematics, Physics, ICT, Chemistry, and Biology from Monday to Saturday in the morning and afternoon sessions. Group-2 and 3 students were placed in two branches: Science and ICT-Electronics, based on their preference. One section of group-2 and three sections of group-3 were placed in ICT and Electronics branch so that they attended the training on ICT, Electronics and mathematics in engineering campus under the school of Computing and Electrical Engineering. The remaining three sections of group-2 and five sections of group-3 were attended the training on Physics,

Chemistry, Biology, Mathematics and ICT in the main campus of the university under the college of science. This scheme was implemented from July 17 to August 28, 2013 and 25 hours was given for each subject. The morning session was from 9:00 AM to 12:00 AM and the afternoon session was from 1:30 PM to 4:30 PM.

Detailed timetable has been developed by the coordinators so that the training runs smoothly without any clash of resource utilization and teachers availability.

The shipped lab equipments have been arrived on time for the training, but some consumable lab items has been used from the university budget since it was very difficult to buy them from the local market.

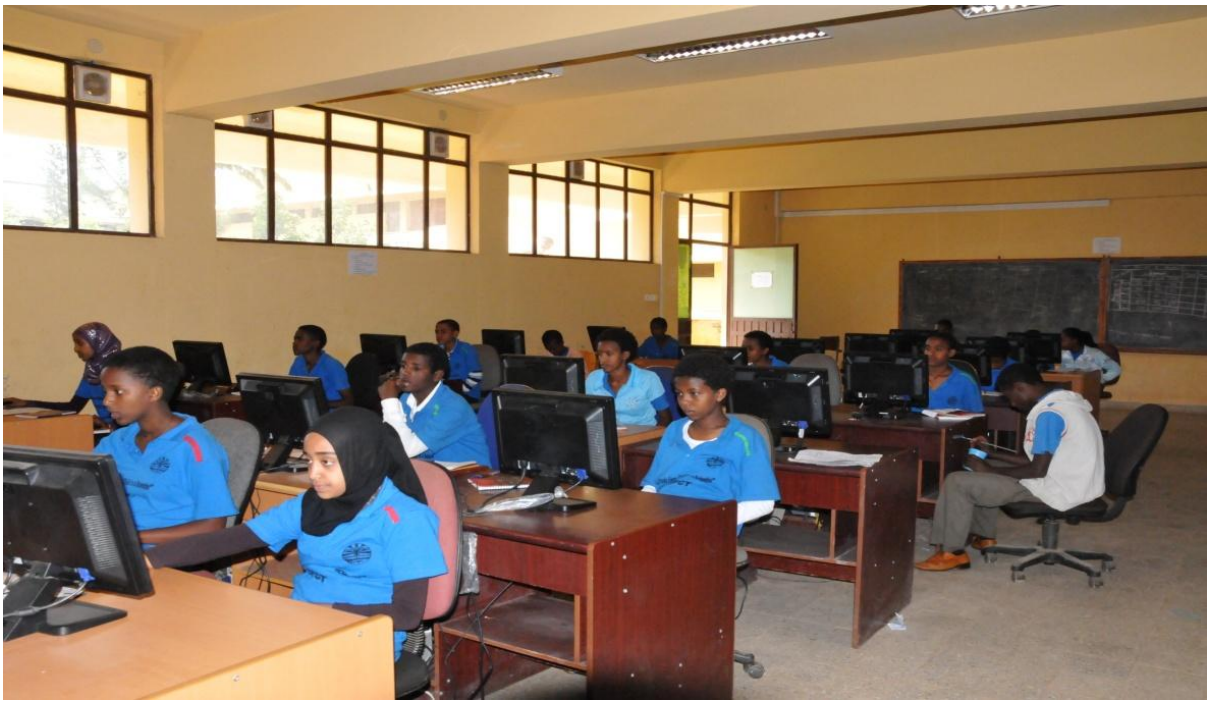

Figure 2: Students in Computer Laboratory

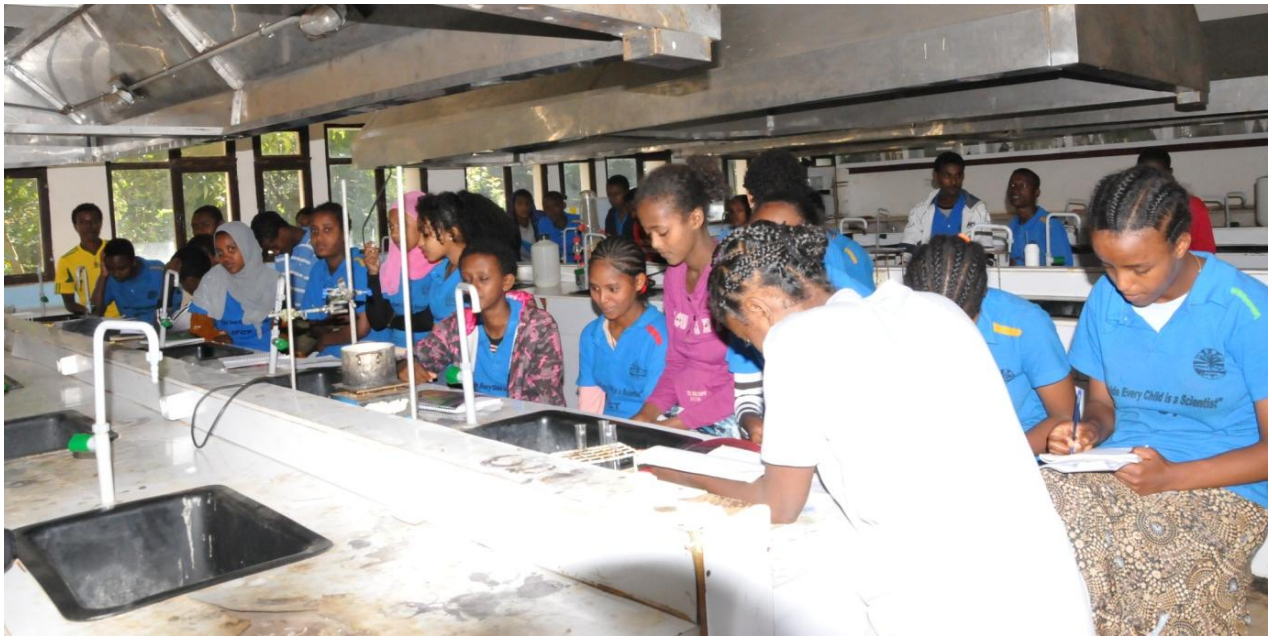

Figure 3: Students in Chemistry Laboratory

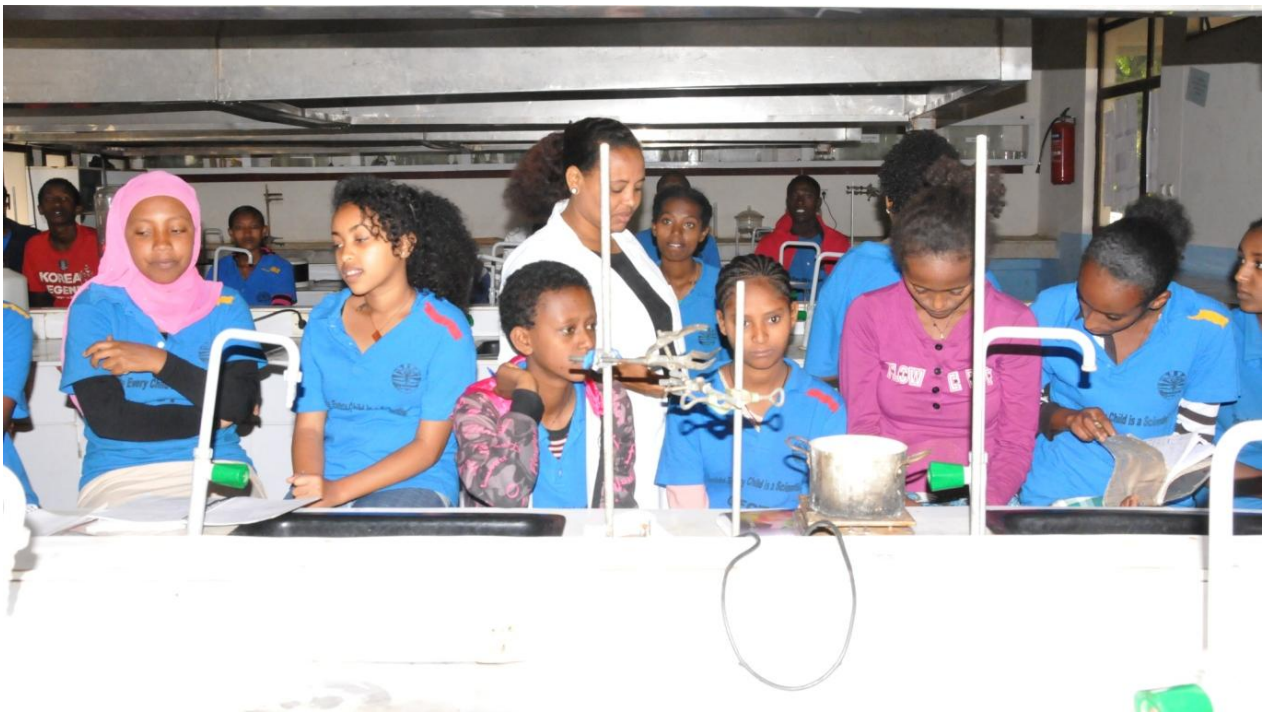

Figure 4: Students in Physics Laboratory

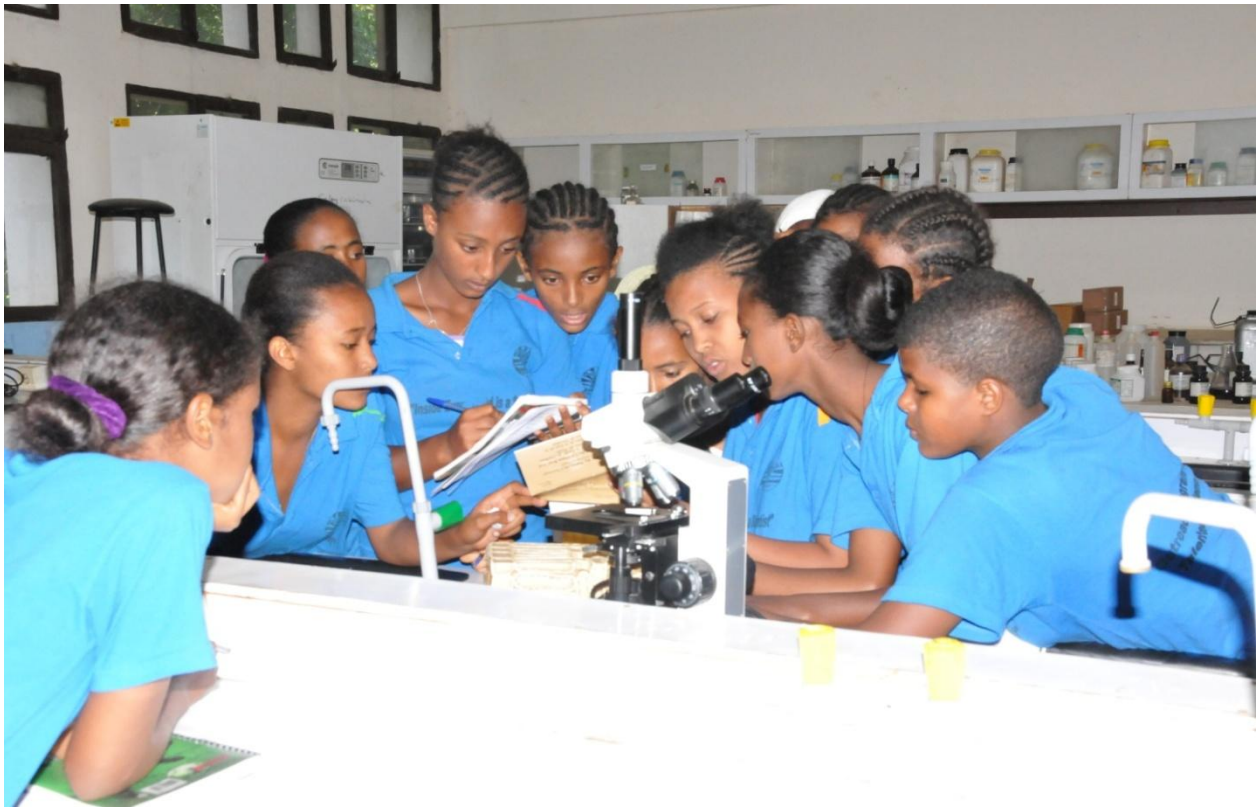

Figure 5: Students in Biology Laboratory

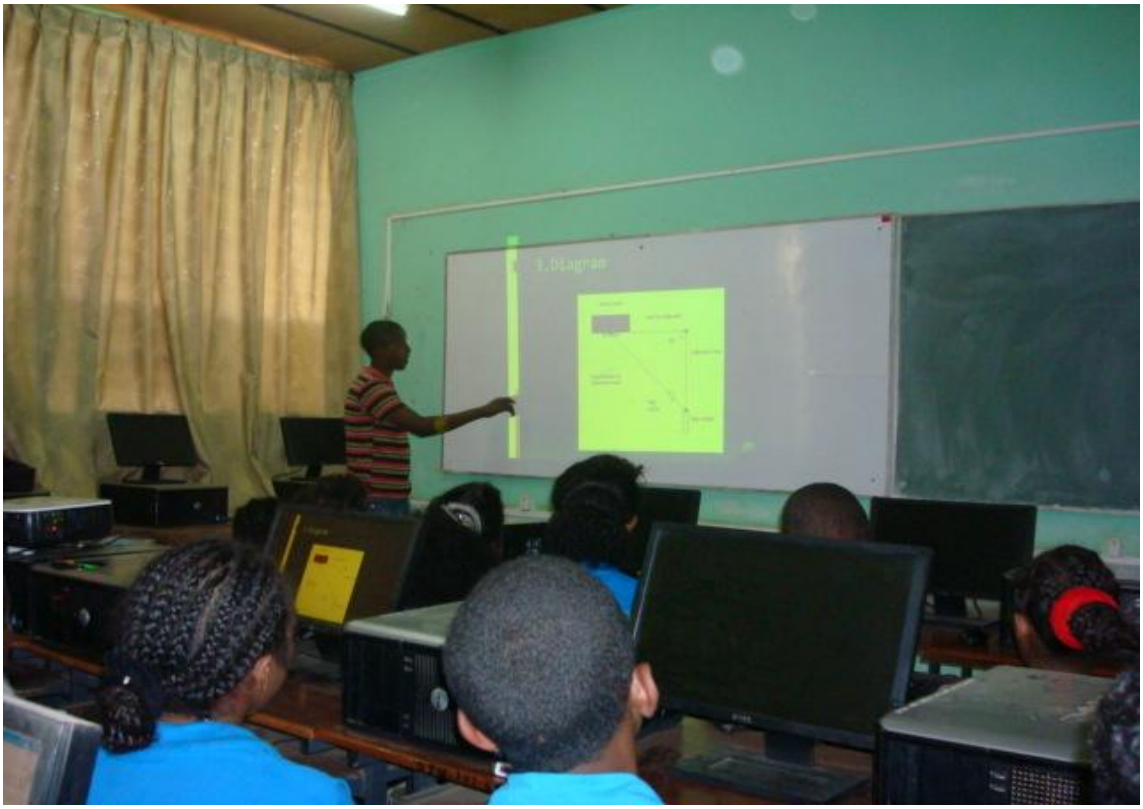

Figure 6: Students in Mathematics Project Presentation

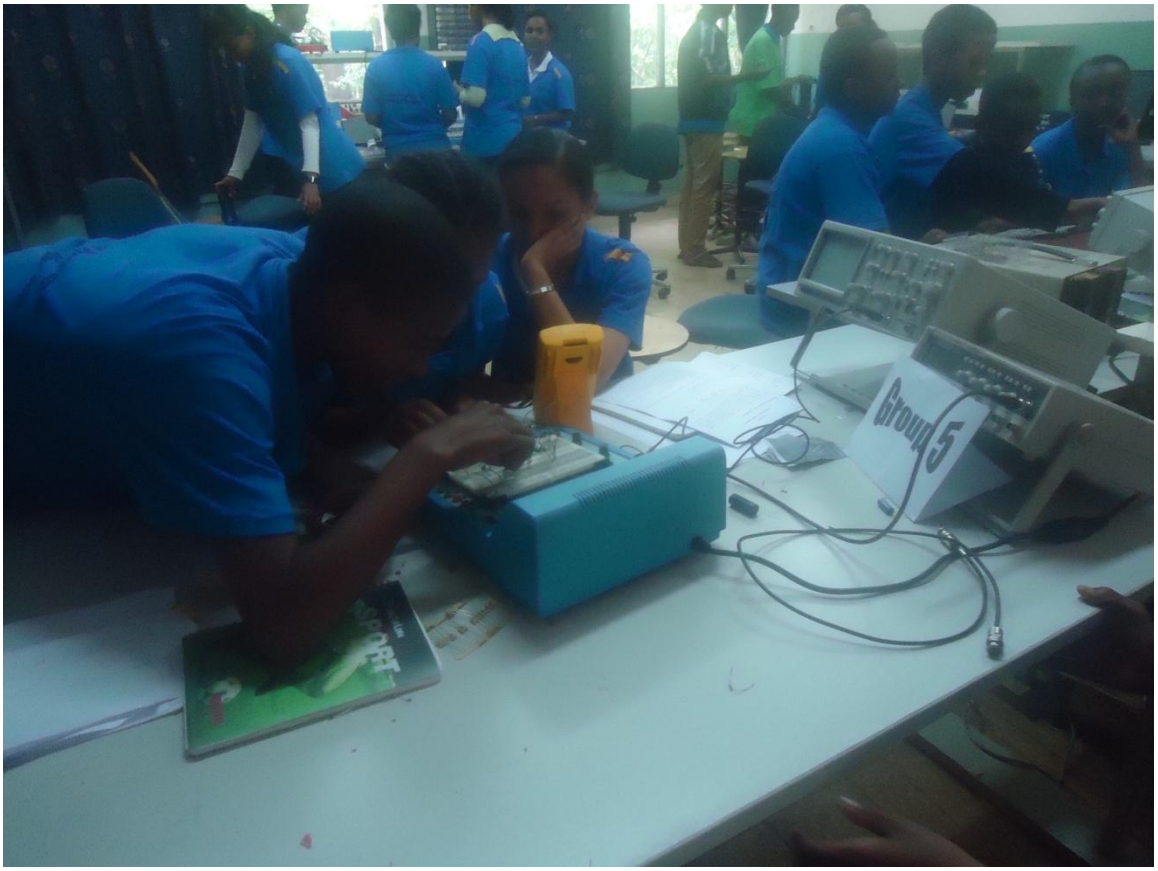

Figure 7: Students in Electronics Laboratory

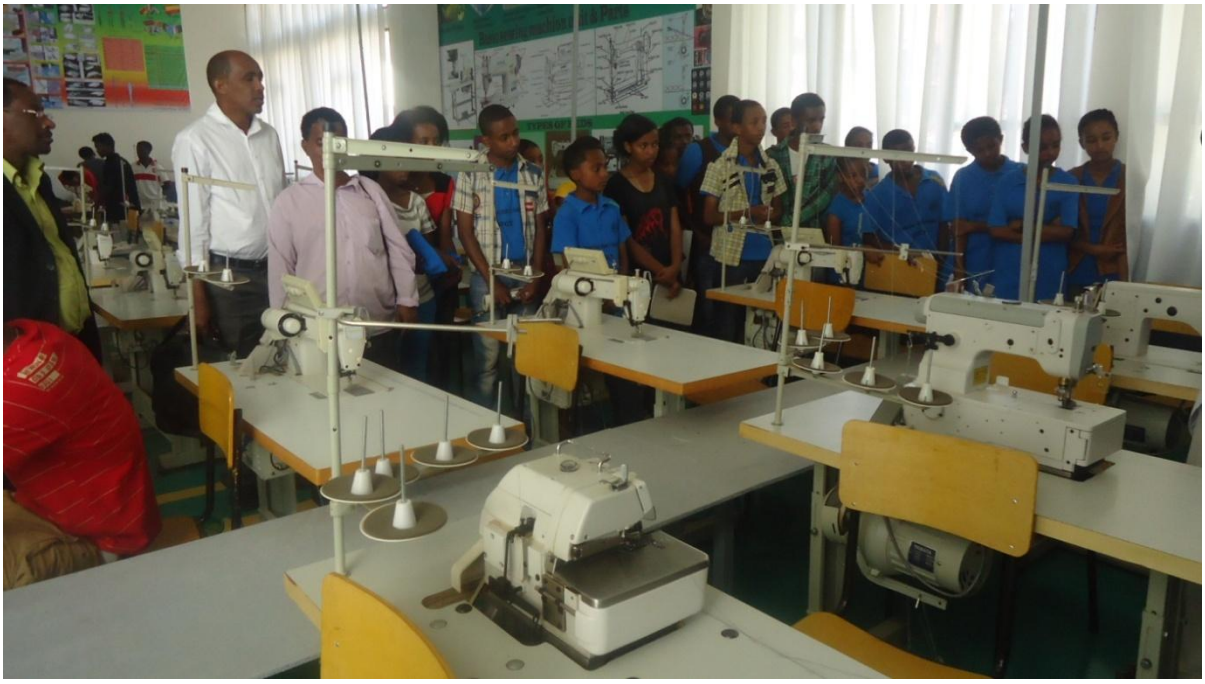

Figure 8: Students in Fashion Design Laboratory Visit

2.2. Meetings and Workshops

The purpose of the meetings and workshops are to aspire the students in the different discipline. Hence to achieve that, we have conducted the following meetings for the students.

1. **Conflict Resolution and Togetherness:** In July 21, 2013, invited professionals from Civics and Ethical Education department (by Mr. Muhamed Yimam) gave lectures and advice for 480 registered students on conflict resolution and togetherness. There was question and answer session so that students raised many debating ideas for discussion.

2. **Time Management:** In the same day of the above meeting, the second discussion was on time management, learning strategy and students reading/study habits for better understanding (by Mr. Asnakew Tagele from Educational and Behavioral Science Faculty). There was question and answer session so that students raised many debating ideas for discussion.

3. **Awareness Creation:**

- **Role and Responsibilities of Stakeholders**(by Mr. Yabibal Addis V/Directior of Amhara Region Education Office): The director first briefly described the objective and aim of the outreach program. Then, he described, the role and responsibility of each parties (the university, the ministry of education, the supporters and the students family) to achieve the objective of this program. In this talk, the students understood that, the family should participate a lot to aspire the talent and effort of their children. Hence, at the end the Director described the efforts that are expected from the students and the family to make this program fruit full.
- **Team Development Strategy for Extracurricular Activities** (by Mr. Birhanu Teshale): The students have got a training on the function of the extracurricular activities. Here, the training aims on how to develop team for extracurricular activity and how to perform the extracurricular activities on different areas such as:
    - ✓ Sport competitions
    - ✓ Regional and local cultures and dramas
    - ✓ Academic presentation and competition
    - ✓ Creativity and others

4. Aspiring the Science and Technology for Development

- **IoT Workshop:** This workshop aimed to create aspiration and awareness on the necessity of science and technology for development. Hence, professionals from science and technology institutes were invited to present their respective themes based on the following schedule.

Bahir Dar University
Institute of Technology
Outreach Program for Talented Students
Brainstorming Program on Technology

Date: Saturday, 10 Aug, 2013

Place: Hall 3 (Poly) **Program Leader: Mr. Taye**

Time(Local) Hr.	Activities	Speaker/ Presenter	Facilitator
2:00-2:30	Students and guest will take their sit	Students and Guests	All Committee Member
2:30-2:45	Opening Speech : • Outreach Program: **What and why?**	Mr. Birhanu Teshale	Mr. Amare K and Mr. Bire G.
2:45-3:00	Aspiring Science and Technology for the Development of Ethiopia: **Opportunities and Challenges!**	Dr. Baylie D.; President of Bahir Dar University	
3:00-3:15	International Trends on Science and Technology	Dr. Nigus G.; Director of SCHFE	
3:15-3:30	Energy and Economical Development; Case of Ethiopia	Dr. Tasew T; Ass.Prof in SCEE	
3:30-3:45	The Role of Textile and Garment Technology for Development : **Opportunities and Challenges!**	Ass. Prof. Addisu Ferede; D/ S/ Director IoTEX	
3:45-4:00	**Break Time**		
4:00-4:15	State of the art in Electrical Engineering; Case of Ethiopia	Mr. Girmaw A. ; Lecturer in SCEE	
4:15-4:30	State of the art in Construction Technology; Case of Ethiopia	Dr. Seifu A; Director of SCWE	
4:30-4:45	State of the Art in Automotive Technology; Case of Ethiopia	Mr. Yonas Mitku; Director of SCIE	
4:45-5:00	Role of ICT for development; Case of Ethiopia	Mr. Abinew Ali; D/Director of SCEE	
5:00-5:30	Project Presentation/Demonstration • Solar Based Digital Traffic Light System • Market Information Systems for Farmers	Mr. Kaledawit and Mr. Mululadam; Ass. Lecturer in SCEE	
5:30-6:00	**Questions from the Students &** **Reflection from Presenters**	Students	
6:00-6:10	Closing Remark: **What is next?**	Dr. Baylie D., President of Bahir Dar University	

2.3. Extracurricular Activities

2.3.1 Cultural Show and Drama

Students were grouped based on their administrative zones or regions for easier preparation for the cultural and drama show. Students coming from Benshangul Gumuz were trained and they practiced to show their dressing and dancing culture, music , history, and etc. And groups of students from Bahir Dar city developed a drama script and they practiced to show on the closing date of the outreach program.

2.3.2 Sport Festival

Based on the above groupings, students played basketball, tennis ball and volley ball games for ten days in many rounds. The final volley ball match between East Gojjam Administrative zone and Benshangul Gumuz Region was very colorful. The award ceremony for the winner were given by outreach Program Coordinator (Mr. Berie Getie).

2.4. Challenges and Proposed Solutions

Even though most students and participant teachers acknowledged the successful accomplishment of the program, there were problems and challenge that we faced during the implementation of the program. To list some of the challenges:

- As the laboratory rooms were shared for different programs, there were clashes of laboratory rooms.
- In the 2013 summer program, the University accepted large number of students in different programs. So instructors participating in the outreach program were also assigned in other programs simultaneously.
- Even though students were eager to visit some historic places and industries, due to continuous and heavy raining, we couldn't implement the plan to have educational and recreational tours even to the nearby areas.

- There were a learning difference among grade 7 and 8 students, as grade 7 students were in grade 6 during the 2005 E.C. academic year, and so the instruction language was local (Amharic) and hence the scientific terms are new to them. Special grouping techniques were used for better delivery so that these students should not feel new to some physical concepts.

- There were differences in students understanding and hence there was a challenge to cover more contents or lab works or projects in 42 days. Selection of students must be done carefully so that students can gain the full advantage (experience) of the program.

3. Student Assessment and Program Closing

3.1. Project Work and Exams

The laboratory work of each subject was accompanied by appropriate project works and field works done in groups of three to five students. There were report writing and presentation of the group works. In addition to these evaluations, all students were assessed through mathematics aptitude test. Based on these assessment results, 10% of the students from each level were selected for further training and project works in the 2013/14 school year.

3.2. Certification and Closing of the program

The 2013 summer outreach program was concluded on August 28, 2013. At the closing time, feedback was collected about the program in general and the 2013 summer outreach program in particular. Students representing different grade levels and regions/zones raised many valuable and encouraging comments to be continued and some to be corrected for the next.

After collecting the feedbacks, **Dr. Tesfaye Shiferaw,** Research and community Services V/President of Bahir Dar University, advised students to use this opportunity for the expansion of the knowledge and experience they gained for their future career and colleagues in their respective schools. Dr. Tesfaye also added that these students are ambassadors for the university, for the program and for the expansion of STEM Education when they returned back to their schools.

After Dr. Tesfaye's talk about future plan of the university to strengthen the school-university linkage, certificate was provided for all students to acknowledge students for their active participation in the 2013 summer outreach program.

Figure 9: Students in the Bahir Dar University stadium during the closing of the program

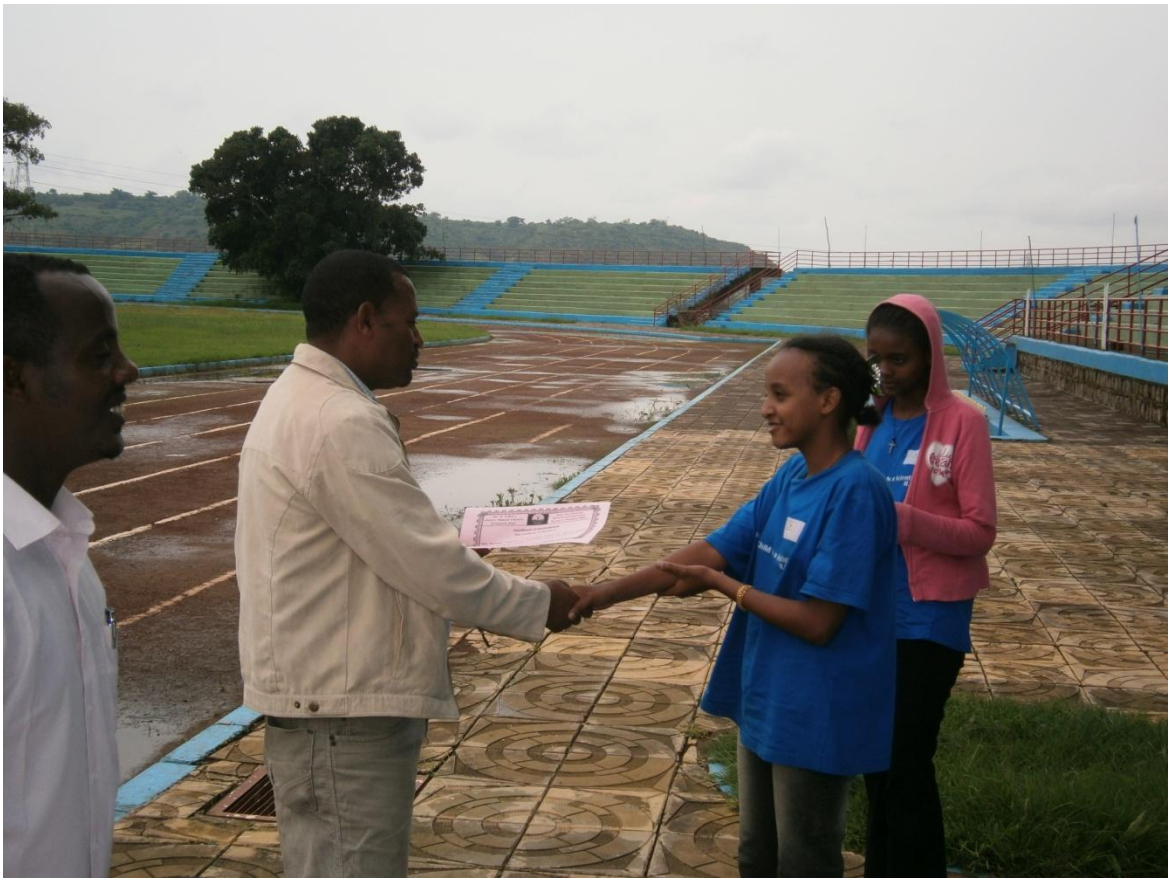

Figure 10: Dr. Tesfaye Shiferaw when he is awarding certificate for students

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Bahir Dar University
Research and Community
Service V/ President Office

Certificate of Participation

This Certificate is Awarded to

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Upon Successful Completion of the Outreach Program for Talented Students Training Conducted from 07 July to 24 August, 2013 at Bahir Dar University in Collaboration with Ministry of Education and Gelfand Family Charitable Trust.

- **"Inside Every Child is a Scientist"**

Tesfaye Shiferaw (PhD)
Research and Community
Service V/President

Berie Getie
Outreach Program Coordinator

4. Budget Breakdown Analysis

Type of Work	Expenses (Birr)	Project Budget: 36,000 USD 659,898 Birr	Remark
Administration Work			
Coordinators Monthly Payment (One year)	64,408.88		
Registration and Related Activities Admin work and consumable lab materials purchase	23,289.00		
Finance Related Work	5,000.00		
Sub Total 1	**92,697.88**	**567,200.12**	
Stationery Materials and Related Payments			
Pen	2,093.00		
Exercise books	13,500.00		
T-Shirt	40,000.00		
Hard disk	6,840.00		
Sub Total 2	**62,433.00**	**504,767.12**	
Students Related Payments			
Students Transport Fee	14,200.00		
Cafeteria	**254,965.34**		**Bahir Dar University RCS Budget**
Dormitory			
Medical			
Sub Total 3	**14,200.00**	**490,567.12**	
Summer Training Payments			
Teaching Payment	408,250.00		
Lab Manual Editing	57,000.00		
Sub Total 4	**465,250.00**		
Total	**634,580.88**	**25,317.12**	

5. 2013/14 Academic Year Strategic Plan

5.1. Special Training for 10% Selected Students

We have conducted aptitude examination and project evaluation for all students. Thus, based on the outreach program guideline, we have selected top 10% from the total students. These students will take special training on this winter to empower their performance for project work.

5.2. Practical and Project Work

The selected students will get an opportunity to conduct project works on some selected areas. They will develop project proposals and then the proposal will be evaluated and the project work will be started. Defined budget will be allocated for each project based on the project evaluation.

5.3. Educational Tour for Students

The selected student will conduct educational tour in selected industries. We have proposed the following industries for the tour.

- Tana Communication
- Beles Hydropower Station
- Bahir Dar Textile Factory
- Bahir Dar Flower Farm

5.4. Educational Tour for Coordinators

To enhance the STEM capacity and experience, we have planned to conduct the following educational tours.

a. **Assessment and Evaluation Tour:** This tour will be performed on each high schools that we have received students in the last summer. The aim of the tour is to evaluate the changes that the student and the school get from the training.
b. **Outreach Program Experience Sharing Tour:** This tour aims to share experience in other universities in Ethiopia. From this tour, we will evaluate our status as compared to other universities.

c. **STEM Experience and Training Tour:** This tour aims to get experience and working knowledge from selected STEM centers in America. Hence, two selected persons will go to America and get the training and visit for two weeks. The visit will be arranged on end of May. All the necessary budget breakdown for the tour will be calculated and reported in end of December.

5.5. STEM Room and LAB Preparation

The STEM center has already on the way to start work. Hence, starting from December laboratory organization and establishment work will be performed by the coordinators. Here we will develop seven laboratories:

- Electronics Laboratory
- Computer Laboratory
- Optics Laboratory
- Chemistry Laboratory
- Biology Laboratory
- Mathematics Laboratory
- Physics Laboratory

Figure 11: Bahir Dar STEM Incubation Center (Side View)

5.6. Project Implementation

The team has developed a proposal to implement:

- Solar-Based Tin-Client Computer Network Laboratories for Model High Schools
- School Management Software
-

➢ **Objectives of the Projects:**

1. To create communication link between each high school and the university STEM center.
2. To facilitate the database management system of selected high schools.

The detail separate proposal for these projects will be presented to the Research and Academic Vice President office based on the planned schedule.

6. Conclusion and Recommendations

- The outreach program needs to be promoted so that university ,mainly educational offices, school community and students family give special attention in the organization of science and technology clubs, students selection, in the delivery methods, etc., for students maximum benefit and STEM education progress.
- Uniform curriculum materials and standard laboratory rooms that suits school students (like STEM Centers) must be arranged all over the country.
- Science and Technology clubs, including mathematics must be organized and supported in schools so that talented students can join the clubs and thus outreach participant students can be selected from these well organized clubs.
- After standard aptitude evaluation and assessment, some top outreach students should be selected and supported (trained) further in the whole academic year through projects and short term special trainings. This will used to empower and aspire their talent and creativity.