ISP Gender Equality Activity

Report activities 2016

Here we report the activities, run by ISP during 2016, for improving the gender balance at the supported institutions. The biggest achievements for this year is the start of a local network of female physicists and mathematics from Uganda and Kenya. Started by the allocation of special, ear-marked funds for gender equality activities, this new network can be considered as a spin-off effect of the different activities ISP run during the year for promoting gender balance at the supported groups and networks. It will be our coming task to connect still more groups and institutions to this very active and enthusiastic network.

1. Gender Equality Activity Grant

In November 2015 ISP announced two grants (50,000 SEK each) for activities promoting gender balance at the supported groups and networks within ISP’s Mathematics and Physics programs. Eighteen applications were received. On 17 February 2016, the funds were granted to Dr. Betty Nannyonga (Dept. of Mathematics, IPMS, EAUMP node Makerere University, Kampala Uganda) and Dr. Edward Jurua (IPPS group leader of UGA:02 at Dept. of Physics, Mbarara University of Science and Technology, MUST, Mbarara, Uganda).

However, the very high quality of other applications inspired ISP to partially support activities of three additional applicants who had shown to be very motivated in promoting gender equality. For this reason, ISP supported a physics training campus for female high school students in Tanzania. The training aimed at improving the recruitment of female students to the science programs of the university. The project was proposed jointly by the node coordinators of the ISP supported networks MSSEESA and EAUMP (Dr. Margaret Samiji and Prof. Eunice Mureithi) at Departments of Physics and Mathematics at University of Dar es Salaam. Moreover, ISP offered two groups in Kenya sponsorships for the participation of one student/staff member to the summer school organized at Uppsala University. In the following sections, more details of the different projects are given.

Gender equality project at Makerere University (Dr. Betty Nannyonga)

The Gender Equality Activity Grant received by Dr. Betty Nannyonga at Makerere University has been used to organize two workshops open to bachelor students, for positively influencing their choice toward natural science and mathematics for their major studies. The first workshop, "Gender equality activities in Basic Sciences – Strengthening and supporting success of women in Basic Sciences", was organized on 30 April. The participation was open to bachelor students. The other workshop, “Gender Equality in the Basic Sciences – Bridging the Gap”, was organized on 25 October. This workshop attracted about 300 undergraduate students filling the Main Hall of Makerere University. Female senior researchers in mathematics and physics from Stockholm University and University of Nairobi gave lectures on the reasons behind and problems with the low number of women in science. Makerere University staff and
students shared their own experiences on the issues. Ugandan TV and radio was present to cover the event. Some impressive results that should be mentioned is that the number of third-year students choosing Math and Physic as major studies has improved during the year (after the two first workshops) from less than 5 to 18. Among the second-year students, there are 40 female candidates choosing Math and Physics as major. More details and results in Appendix 1.

Figure 1. Left: Betty Nannyonga, one of the two awardees of the ISP Gender Equality Activity Grant; right and bottom: images from the second workshop held at Makerere university last 25 October.

Gender equality project at MUST University, Mbarara, Uganda (Dr. Edward Jurua)

In Mbarara, the grant was used for an outreach program to three selected secondary schools in Western Uganda, for conducting a baseline survey and for organizing a final conference. The aim of the school visits was to motivate more girls into pursing science career. Before meeting the students, a survey was conducted in these schools using a simple questionnaire to establish the feelings and thoughts of the girls about science courses and careers. During the school visits, the girls were introduced to general sciences and why it is important to do science related courses before narrowing down to physics as a study area. Each school was visited two times. The first visit incorporated facilitators from different science fields and it served as a career guidance day. The second visit included motivational talks on physics,
by female physicists and simple demonstration on application of Physics in real life. After the School visits and baseline survey, a conference was organized to discuss challenges women face in science, and possible solutions. The conference was based on the findings of the school visits and the survey. The participants to the conference were drawn from selected secondary schools in Western Uganda, from universities, and included students who completed BSc and had not continued with postgraduate studies, graduates of science, science lecturers, and the MUST WIST (Women in Science and Technology) group. (Appendix 2)

Gender equality project at University of Dar es Salaam, Tanzania
(Prof Eunice Mureithi, Mathematics and Dr. Margaret Samiji, Physics)

Due to the very good application submitted jointly by the Dept. of Physics and Dept. of Mathematics at the University of Dar es Salaam, ISP granted funds for a Science Camp for female high school students of age between 17 and 19 years, held in July. The aim of the campus was to encourage and support female students with potential to continue and excel in Physics and Mathematics (to facilitate their capacity and performance in their examinations) for increasing the number of female students in Science subjects at the university level. The applicants had recognized some important needs to be addressed by the Science Camp: exposing girls to the science related fields from an early age, encouraging girls to embrace mathematics and physics/sciences and correcting stereotypical misconceptions, creating a friendlier environment for female students and building their knowledge capacity in the subjects. Moreover, all the team members of the Camp were female staff of the University of Dar es Salaam to provide role models top the Camp participants (Appendix 3)

2. Granted project from the Equal Opportunity Executive Committee (UU)

The application submitted to the Equal Opportunity Executive Committee (Arbetsgruppen för lika villkor) at Uppsala University for a workshop for female students (PhD and master students) was granted. The funds were used for inviting 5 female students/researchers from supported groups, to participate in a summer school organized by the Dept. of Physics and Astronomy at Uppsala University and the Dept. of Physics at Freie Universität Berlin, Germany. Among the 5 participants there was Betty Nannyonga (Makere University, Uganda) and Priscilla Muheki (Mbarara University, Uganda) Lindah Karea (INST, University of Nairobi, Kenya) then Alix Masoop Dehayem and Ruth Wabwile (both form the Dept. of Physics, University of Nairobi, Kenya). Spending two weeks together in Uppsala gave the participants the opportunity to know each other and start to discuss common experience and activities. Attached to this document it is the final report about the summer school. (Appendix 4)

In brief, the school included both seminars and research visits to laboratories and research groups in physics in Berlin at Uppsala and Stockholm as well as lectures, seminars and workshops on gender equality. The goal was to increase the awareness of gender bias that could exist at home institutions and in academy in general and to start a network of younger female researchers in Africa. The project seems to be succeeded (see Appendix 4). The participants were chose considering the applications to the Gender Equality Activity Grant announced and allocated by ISP at the beginning of 2016. Then Betty Nannyonga from Makerere University was invited to join the schools being one of the project grantees, and Priscilla Muheki was also choose as participant from Mbarara university, the second granted group in Uganda. The other invited participants were Alix Dehayem and Ruth Wibwile from the IPPS supported KEN:02/KEN:04 projects, and Lindah Karea from the IPPS KEN:01/2 groups, all from University of Nairobi, Kenya and from the short-listed groups with very good applications to the Gender Equality grant.
3. ISP in collaboration with Sida

ISP took part in a workshop at Sida (21 October) where the collaborator at the Centre for Gender research (UU) Minna Salminen Larsson gave a seminar and guided a group activity. This was well evaluated by the participants, who discussed and shared experiences both in the small working groups but also with the rest of the audience.

4. Application for Vice Chancellor Strategy Funds at Uppsala University

ISP and the Centre for Gender research at Uppsala university sent a join application to the Vice-Chancellor for Strategic Funds. The application targets resources for the development of workshops and relative teaching/working material to be used at the supported groups and
networks and at their institutions. The content is intended to be developed together with our overseas colleagues. The application was welcome by our Vice Chancellor but seems to be stacked at the faculty level.

5. MFS project on Gender balance at University of Nairobi

Two MFS students spent two months in Nairobi working with the students involved in ISP programs. The students’ project, designed together with the UU Centre of Gender Research, was focused in identifying factors behind the gender representation in technical higher education. In the spring the two Swedish students carried interviews and attended meeting with students and researchers of the IPPS KEN01/2, KEN02-KEN04 supported groups. An interview of these two students and the link to their final report report can be found at: http://www.isp.uu.se/what-we-do/mfs/mfs-students/women-in-science-in-kenya/ and in Appendix 5.

Figure 3. Carla Puglia visiting University of Nairobi, meeting with the Swedish MFS students, the students and the staff of the IPPS supported groups KEN:02 and KEN:04.


Considering the very good quality of many of the applications we got for the Gender Equality Activity Grant, we realized that it is important to support this kind of activities in a sustainable way. Considering also the promotion of the gender mainstreaming working method implemented by Sida, ISP included in this year project applications, the possibility to apply for (ear-marked) extra funds for gender activities to run during the three-year grant period. In this way, we will be able to support gender projects in a more continue way improving sustainability of the suggested and implemented changes. Of 13 project applications within the Physics Programme, 6 groups apply for gender funds. We will grant 5 of them for an amount of totally 120 000 SEK/ year for three years. The groups will get about 20 000 - 30 000 SEK each for ear-marked activities. It is worth to mention that Prof. Siddique e-Rabbani, leader of BAN04 (IPPS) applied for institutionalizing a PhD position for female candidates. He hopes that this external-funded PhD position will allow the female students to work part-time, allowing them to harmonize work and family duties.
REPORT ON GENDER ACTIVITIES IN BASIC SCIENCES—SUPPORTED BY UPPSALA UNIVERSITY INTERNATIONAL SCIENCE PROGRAMME-ISP

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5/1/2017
Report on Gender Equality Activities in Basic Sciences Makerere University

On October 08 2015, ISP recognized the need of increasing female participation in basic sciences research where females were under represented (specifically Physics and Mathematics). ISP pledged to support strategic activities for promoting access of women to science tertiary education, to research and career opportunities leading to academic key positions.

On November 25th Dr. Betty Nannyonga responded to the call by ISP for the Gender Activity Grants. On 02/17/2016, the greatest news that Makerere University had won he grant were received from Prof. Carla Puglia and the ball was set.

Right away arrangements started to have the first seminar and workshop in April 26 2016. The first seminar was held on 03/31/2016 in Botany/Zoology laboratory, with the main objective of introducing basic scientists to the expected activities, and calling for collective cooperation. In that meeting, a tentative date for the first workshop was suggested for April 26 2016.

Arrangements were made with collaboration from the School of Education and School of Gender Studies. The following was the program for the day:-

**Gender Equality Activities Workshop**

*Theme: Mentoring, strengthening and supporting the success of women in basic sciences*

April 30th 2016, College of Engineering, Design, Art and Technology – CEDAT Conference Room

<table>
<thead>
<tr>
<th>Tentative Schedule</th>
<th>Time</th>
<th>Activity</th>
<th>Responsible Person</th>
<th>Moderator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8:00 AM – 8:30 AM</td>
<td>Arrival and Registration</td>
<td></td>
<td>Secretariat</td>
</tr>
<tr>
<td></td>
<td>8:30 AM – 8:35AM</td>
<td>Welcome remarks</td>
<td>Dr. Betty Nannyonga, Project Leader</td>
<td>Rapporteur</td>
</tr>
<tr>
<td></td>
<td>8:35 AM – 8:45 AM</td>
<td>Remarks by the Head of Department, Mathematics</td>
<td>Dr. David Ssevviiri</td>
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<tr>
<td></td>
<td>8:45 AM – 9:05 AM</td>
<td>Opportunities for Women in Physics</td>
<td>Associate Professor Florence D’ujanga, PhD Professor of Physics</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9:05 AM – 9:25 AM</td>
<td>Woman in Mathematics: The talent pipeline from classroom to boardroom</td>
<td>Mrs. Sylvia Genza, IT Business Control, Stanbic Bank Uganda Limited</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9:25 AM – 9:55 AM</td>
<td>Key Note Speaker: Experiences of teaching</td>
<td>Mrs. Assumpta Kasamba,</td>
<td></td>
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</tbody>
</table>
As part of the outreach and advertisement, posters were pinned around the College of Natural Sciences and a banner pinned at the Department of Mathematics. The title of the workshop was “Gender Equality Activities in Basic Sciences” with the theme “Mentoring, Strengthening and Supporting the success of women in Basic Sciences”.

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker/Topic</th>
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<tbody>
<tr>
<td>9:55 AM – 10:05 AM</td>
<td>Remarks by the Head of Department, Physics</td>
<td>Dr. Ireeta Tumps</td>
</tr>
<tr>
<td>10:05 AM – 10:20 AM</td>
<td>Overview of the Gender Equality Activities in Basic Sciences in Makerere University</td>
<td>Dr. Betty Nannyonga</td>
</tr>
<tr>
<td>10:20 AM – 10:35 AM</td>
<td>Strengthening and Mentoring the girl in basic sciences: Experiences from a Physics major</td>
<td>Ms. Grace Nanteza, MSc student, Department of Physics</td>
</tr>
<tr>
<td>10:35 AM – 11:00 AM</td>
<td>Tea Break</td>
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<tr>
<td>11:00 AM – 11:20 AM</td>
<td>Group Discussions</td>
<td>All female basic scientists</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dr. Betty Nannyonga, And Ms. Grace Nanteza</td>
</tr>
<tr>
<td>11:20 AM – 12:40 PM</td>
<td>Group Presentations</td>
<td>Female student leaders in basic sciences</td>
</tr>
<tr>
<td>12:40 PM – 12:50 PM</td>
<td>Way Forward</td>
<td>Dr. Betty Nannyonga</td>
</tr>
<tr>
<td>12:50 PM – 1:10 PM</td>
<td>Closure of Workshop</td>
<td>Prof. J.Y.T Mugisha Principal College of Natural Sciences</td>
</tr>
<tr>
<td>1:10 PM</td>
<td>DEPARTURE</td>
<td>DEPARTURE</td>
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</tbody>
</table>
In the first workshop, we could not get regional presenters due to a strict budget. The events were smooth, but some students left early due to a test that had been moved to that day the day before.

The following was the report from the speakers for the day:-

**GENDER EQUALITY ACTIVITIES IN BASIC SCIENCES FIRST WORKSHOP -- REPORT**

Theme: Mentoring, strengthening and supporting the success of women in basic sciences.

April 30th 2016, College of Engineering, Design Art and Technology- CEDAT conference Room.

**REMARKS FROM DR. SSEVIRI -- Head of Department of Mathematics**

Thank you for responding to the call. Statistics show that there are fewer female mathematicians at the university. The department of mathematics has 26 academic staff with only 3 females and 4
support staff with 3 females. This says something about the females in basic sciences. The mathematics department needs female teaching staff members with PhD. Women should work hard to achieve their goals. There’s 18 post graduate students, 1st and 2nd year at the moment and there’s only one girl. More needs to be done.

**WOMEN IN MATHEMATICS - MRS SYLVIA GENDA**

The statistics in Makerere do not favor us as women. You have to understand that you are talent. Identify yourself as a woman and work harder. Women have to work harder than men because they need to prove themselves. The challenge is to work hard because there are many opportunities for women in mathematics. Look at mathematics as a tool that can be used to impact the communities. It is a tool that can be applied to other disciplines.

**Points to note.**

- Identify what you want to do. Find an objective and work towards it. You may need to do activities that you don’t like so much but keep doing them as long as they get you to where you want. Keep focused.
- Set realistic and specific goals. Put in the time to achieve these goals.
- Identify your strength. Do something that you will enjoy doing even without pay. Identify an area in mathematics that you’ll enjoy even when it becomes tough.
- Don’t blame your career choices on people around you and those you’ve met along the way. That is to say, it is wrong to base your failure on the lecturers, parents, and friends. Your career choices and development depends on you.
- Make the right kind of connections. Network with people who will advance your academic growth.
- Stay focused. Do those things that will take you to the destination you want.
- Seek excellence. Do not just do tasks or activities to finish but to learn something out of it and excel at it.
- Be disciplined and principled. Continuously do those things that will take you to the next level. It takes discipline to achieve the goals that you have set for yourself.
- Do the work. Put in the effort. Do not use people to do the work that you should be doing. Having done the work enables you to help others.
- Do not allow yourself to feel like a woman when it comes to capability and ability. Work hard because women are as good as men.

**OPPORTUNITIES FOR WOMEN IN PHYSICS – PROF. FLORENCE D’UJANGA**

Science has the ability to produce women with leadership skills.

**Challenges to education opportunities for women.**

- Tradition prohibits women from working from home because the woman has always been seen as the homemaker. But the benefits outweigh the problems assumed. Women can multi-task. Education empowers the women to do a lot of things like careers, mothers,
mentors etc. Women are under-represented in the sciences. However, such projects as these empower and encourage the young generation of females. Documenting powerful women stories can inspire others. Have ambition and motivation. Once you focus, you’ll get what you want. Have an aim.

- Some basic sciences look abstract. Understand the concepts of math and physics. Science keeps evolving all the time. Today’s abstract science will be applied tomorrow.

What is the way forward?

- Aim to achieve a high class degree. With a good degree, there are so many career opportunities and fields to go into.
- Having a good physics degree sets you apart as a female scientist. Physics can be applied to basic things at home and within the environment.

Opportunities with a physics degree.

Teaching is not the only option.

- Geophysics, Biophysics, Oil and gas, Geological surveillance, radiation protection.
- Aerospace, Military personnel’s, Civil aviation, banks.
- Telecom engineers, telephone companies.

Related fields:

- IT companies, consultancy, financial services, legal services, transport services.

Many employers accept all graduates. They believe that with a high class degree, one can be trainable.

Underrepresentation of girls is a task for all of us. The main aim is to encourage and support women in basic sciences. The problem may seem big but the good thing is we have started. We can impact and change the statistics and have more females within the basic sciences department.

**KEY NOTE SPEAKER: MRS ASSUMPTA KASAMBA- HEAD OF MATHEMATICS DEPARTMENT, KINGS COLLEGE BUDDO.**

**Experiences of teaching Mathematics/physics to girls and boys**

- Girls are embarrassed to raise up their hands in class.
- Girls are threatened by boys. Boys reluctantly accept good female students.
- Boys will always want to put you down especially sexually. As a woman, command a high degree of discipline.
- The girls underestimate themselves while boys overestimate themselves. Boys naturally think mathematics/physics are their subjects. They always hold their heads high even when they have failed while girls shy away and look down on themselves.
- Always be prepared. Build up concepts step by step and then use examples to explain the concepts.
• Bring mathematics into the real world. Start from simplicity and use physical examples. Girls need a logical flow of ideas and steps while boys can figure it out.
• Girls do not want to risk. They have a pre-determined answer to the problem of math. They fear to give wrong answers. They prefer to have private consultations and individual questions for the teachers.
• Girl’s presentations are always tidy and neat even when their answers are wrong while the boy’s presentations are untidy and scattered.
• Girls do their work quickly in order to avoid punishment but boys will try to get out of doing homework. They show their competence during exams.
• Teachers should teach through dialog. Take a little more time to introduce a new topic. Relate with your students. Use visual aids. Do not throw unfriendly comments to students.
• Do not sympathize with girls. Mathematics is not for cowards.
• Ensure quality working time with girls. Change the study environment.
• Teachers assume mathematics is easy de-touching themselves from slow learners. Take yourself back to that ‘class time’ experience and teach from that point of view as a learner.
• Girls should not see themselves as girls but as students of mathematics and as competitors.
• Mathematics teachers do not want to read. They do not want to get information and end up re-echoing what their teachers taught them. Prepare, read and find out how to make the topics friendlier. Do not repeat the same explanation when the student has not understood. It’s pointless.
• Use textbooks for each student. It helps with the interaction between students and teachers. Use a variety of books to teach.
• Mathematics contests were thought to be for mad people and therefore could only be done by boys. However, there is an increasing number of girls getting involved. There’s still a lot of work to be done.
• Participation can change a mindset. Some girls who have participated in these contests have gone on for higher studies with good courses which are well sponsored.
• Do not be afraid to go out there and get exposed.

OVERVIEW OF THE GENDER EQUALITY ACTIVITIES IN BASIC SCIENCES - DR. BETTY NANNYONGA

Activities planned.

3 workshops expected to be done.

This one was student oriented to find out how the students want to be helped.

Another workshop was done in secondary schools. The students blame themselves for being reluctant and lazy. They don’t blame their teachers.

Utilize the chances that you have at university level. Mathematics can be a link between disciplines. Know how to use the subjects that you have to take you where you want. The aim of this project is to guide you on how to utilize your subjects. The project was specific to mathematics and physics. Future activities include: Outreach activities, workshops, women in sciences club, mentors in the
department. The club will ease the link between teachers and students. Continue collaborations with Mbarara University. Thank you, Dr. Ssevviiri for all the support.

EXPERIENCE FROM PHYSICS MAJOR- MS. GRACE NANTEZA

None of us has ever thought of doing mathematics physics at university. We always want to do engineering, medicine, pharmacy etc.

There are so many reasons we worry when we are admitted for education. For example stature, little pay, stubborn, students etc. But teaching is not the only option. We need to change our attitudes towards these basic sciences and have a positive attitude to teaching as well. Work hard and be determined. Look at the applications of the basic sciences. We don’t keep our knowledge in the books but we apply it to our environments and communities. Women underestimate themselves yet we have capabilities too. The answers are always in the books. Read, read and read. Girls should stop assuming they should always be given. Work hard. Let us apply whatever we have learnt in the community.

GROUP DISCUSSION- Areas that you need help or mentorship

- Reduce the gap between lecturers and students.
- Regular seminars.
- Opportunities that are non-academic.
- Communication network to enable students who have finished the courses to access.
- Outreach to rural schools.
- Lectures are too fast for slow learner.
- Encouragement from lecturers.
- Discouragement from the students can stop one from choosing a course unit.
- More female role models.
- Links between lecturers and students increase.
- Math contests for ladies.
- Sensitize students on the application of math and physics.
- Choose lecturers for career guidance.
- Sensitize students on the use of minor subjects.
- More time for workshops.
- Lack of support; academic, encouragement, references, training companies.
- Projects to rural areas. Best students end up getting pregnant and married.
- Established science clubs to deal with challenges.
- More practical subjects/course units.
- Inappropriate teaching aids e.g. projectors for physics.
- Discouraging comments from lecturers.
- Excellency is expected at university.
- Visual aids and practical work should be used.
- Academic lecturers minding marks rather than helping students.
- Lecturers keep in mind slow learners.
• Sensitize students on the relevance of BSc degree.
• Intimidation from lecturers i.e. statements about retakes.
• Be intentional about mentorship i.e. encouraging students who are not vigorous.
• Scholarships for girls who are smart. Avail them to students.
• Mathematic minors are not given opportunities.
• Minors are under looked yet they can use these minor subjects to help their majors.

Feedback

Some of the points mentioned are the aims and objectives of the project.

• Lecturers cannot know your problems if you do not come to see them.
• Do not give yourself bad label like not vigorous.
• Encourage fellow students to approach lecturers.
• Be proactive.
• Set your own goals and the lecturers will help you achieve them.
• The aim is to have seminars every two months, have outreach activities to rural schools and support services for students.

Closing Remarks

• You have to input for you to achieve your academic and personal goals.
• These principles can be applied to all areas of life.
• Communication lines are open between mentors and students.
• Break the stereotype and get out of the comfort zone.
• Be aggressive.
• Be on the lookout for opportunities and use them.
• Do not be lazy.
• Be a role model.
• Work hard. Everyone who comes to university is clever.
• Get a good degree.
• Students are not treated differently so please consult with lecturers.
• Focus.
• Thank you all for attending the workshop.

Closure of Workshop – Prof. J.Y.T Mugisha

This is the day. Congratulations to Dr. Betty Nannyonga and the department of mathematics for winning the grant for the project.

Thank you to all the speakers who have been involved in the workshop.

Messages to students

• Look at yourself in the mirror every morning and note that you are smart.
• Look at your neighbor and know that you are better than them.
• Look back as far as you can and remember how many you have left behind.
• Look at the future and be positive. Thank God.

Prof. Ingrid Daubechies, the president of international mathematical union is an inspiration. She has come up with the Daubechie wavelets. If she did it, you can too.

More of these workshops needed. Bring another person next time. Thank you for attending.

During the workshop, field work was carried out, using questionnaires. The data will be used to answer many questions such as “Is gender bias, a mental or social problem”.

**Students began their end of year examination in May 2016, and later broke off for the long holiday till August 2016.**

During the long break off by the girls, the Women in Natural Sciences (WINS) activities started with ideas from the staff of the Department of Mathematics and School of Gender Studies. By August, a draft was available, and application of an address from Makerere Directorate of ICT Support (DICTS) sought. It was agreed to have WINS under College of Natural Science (CONAS), especially since the activities were being carried out in the College.

The next seminar was held on September 22 2016, in Botany Year II laboratory, this time with a higher attendance, and main aim of discussing issues that inhibit good performance by girls in Mathematics and Physics.

**Seminar 22nd September 2016 BOT Yr. II LAB**

**Agenda**

1. Prayer
2. Communication from Chair
3. Reactions & Discussions
4. AOB

1. Prayer was led by Ms. Namukasa Florence at 1:15pm
2. Communication from Dr. Betty Nannyonga:
   i. Advised ladies to be free during discussions
   ii. Advised ladies to be open and share their challenges
   iii. Need to find a way to retain girls in mathematics
   iv. Need to help girls succeed in mathematics
   v. Cannot help unless reasons for low numbers are known
   vi. Second Workshop on Tuesday October 25 2016 in Main Hall
   vii. Two international presenters, presentations from student female leaders, and from a male lecturer from CONAS
3. Reactions:
   a. Needed more course works-- Students tend to copy therefore tests better for testing
b. Retakers are segregated--- too discouraging to already vulnerable girls--- should be strongest when challenged

c. Girls chose where to minor because of band wagon, no advise, no clear future with Mathematics/Physics--- Will initiate meetings during semester II to talk to first years

d. Students in mathematics/physics wanted to be doctors or engineers but failed to make it so here by default—when the world gives you lemons, make juice

e. Requested for more platforms where they share challenges and discuss possible solutions—formation of WINS to be launched in the October 25 Workshop

f. Need sensitization about mathematics/physics and applications in real life

g. Lack of role models--- to be worked on and institute a practice in department to show case successful women in mathematics/physics

h. Bias against lecturers due to their comments—look at the content and where you are headed, not the lecturer

i. Financial constraints---scholarships are available at graduate level

j. Need mentors--- Project leader available

4. AOB—

i. Will circulate program to representatives before workshop

5. Seminar ended at 2:30pm

After the Seminar, arrangements for the October Workshop were in high gear, as the girls were excited to organize and own the workshop. We managed to get two international Plenary Speakers, Dr. Lovisa Sumpter Mathematics Educator, from Stockholm University in Sweden, and Dr. Alix Dehayem, from the University of Nairobi, Kenya. The title of the workshop was “Gender Equality in Basic Sciences” with the theme “Bridging the gap”.

The program for the day was as follows:

**PROGRAMME**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Responsible Person</th>
</tr>
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<tbody>
<tr>
<td>8.00-17.00 hrs</td>
<td>Opening Plenary session</td>
<td>Program Coordinator</td>
</tr>
<tr>
<td>Time</td>
<td>Activity</td>
<td>Presenter(s)</td>
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<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>8:30 - 9:00</strong></td>
<td>Arrival and Registration</td>
<td>Student Leaders</td>
</tr>
<tr>
<td>9:00 – 9:10</td>
<td>Welcome remarks by the Project Leader</td>
<td>Dr. Betty Nannyonga</td>
</tr>
<tr>
<td>9:10 – 9:20</td>
<td>Opening of the Workshop by the Principal, CONAS</td>
<td>Prof. J. Y.T Mugisha</td>
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<tr>
<td>9:20 – 9:30</td>
<td>Remarks by the HOD, Mathematics</td>
<td>Dr. David Ssevviiri</td>
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<td>9:30 - 9:40</td>
<td>Remarks by the HOD, Physics</td>
<td>Dr. Ireeta Tumps</td>
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<td>9:40 - 10:40</td>
<td>Plenary Speaker— “Why the difference is in the structure and not in the individual”</td>
<td>Dr. Lovisa Sumpter -Sweden</td>
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<tr>
<td>10:40 – 11:10</td>
<td>Talk: Why so few?</td>
<td>Dr. Alix Dehayem- Kenya</td>
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<tr>
<td><strong>11:10 - 11:30</strong></td>
<td><strong>BREAK</strong></td>
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<td><strong>11:30 – 12:10</strong></td>
<td><strong>BRIDGING THE GAP</strong></td>
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<td>11:30 – 12:10</td>
<td>Current Status, Launch of WINS</td>
<td>Dr. Betty Nannyonga</td>
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<tr>
<td>12:10 – 1:00</td>
<td>Gender Issues/Challenges in the University Lecture room</td>
<td>Mr. Fred Mayambala, Mr. Alex Behakanira Tumwesigye</td>
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<td><strong>1:00 – 14:00</strong></td>
<td><strong>LUNCH</strong></td>
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<td><strong>14:30 – 14:40</strong></td>
<td><strong>PRESENTATIONS FROM STUDENTS</strong></td>
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<tr>
<td>14:30 – 14:40</td>
<td>Science I</td>
<td>Ms. Ashaba Shillah</td>
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<td>14:40 – 14:50</td>
<td>Education I</td>
<td>Ms. Josephine Nabakooza</td>
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<td>14:50 – 15:00</td>
<td>Science II</td>
<td>Ms. Bukirwa Joanita</td>
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<tr>
<td>15:10 – 15:20</td>
<td>Education II</td>
<td>Ms. Ssanyu Vision</td>
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<td>15:20 – 15:30</td>
<td>Science III &amp; Education III</td>
<td>Ms. Nazziwa Carol/Oliver</td>
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<td>15:30 – 15:40</td>
<td>MSc. Mathematics</td>
<td>Ms. Helen/Caroline</td>
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Gender workshop 10/26/2016 Main Building Makerere University

Presentation from Ssenyunja Vincent

- Appreciated girls taking mathematics that they are really talented and encouraged them to remain focused.
- Advised the girls to admire female lecturers especially Dr. Betty because she is a good example.
- Advised girls to attend and participate in group discussions.
- Avoid blaming lecturers

Challenges

- Lack of confidence towards mathematics.
- Some girls have a negative attitude towards mathematics especially in some topics.
- Some girls are minimized by boys.
- Big lecture rooms that is to say the learning environment is not conducive to studying mathematics.
- Girls are being taken advantage of by boys especially when they seek assistance from them.

Presentation by Ashaba Bsc. Scie and Econ

- Thanked Dr. Betty and everyone who participate to make the workshop a success.

Challenges

- Demoralization from other people especially 2nd and 3rd years.
- Some lecturers are not audible and clear when teaching.
- Few reference books for revision purposes.
- Some students are challenges to themselves ie they are lazy, they do not do course works, they don’t do research etc.

Presentation by Nabakooza Josephine  (Bsc. Educ & Math)

- Thanked God for that day.
- Thanked Dr. Betty and the organizing committee for such a big opportunity to them.

Challenges

- Girls lack passion for the subject.
• The department has many male lecturers to female lecturers which makes hard for girls to make personal consultations in case need arises.
• Clashes in the time table especially for physics and mathematics.
• Some lecturers have always have two handouts; a summarized one and detailed one which sometimes confuse students.
• Some girls fear to ask question while in class because boys minimize them and some lecturers do not give them a chance or instead intimidate them with statements like “anyone with a stupid question!”

Comments from Dr. Alix
• Advised students to always share knowledge and avoid being selfish.
• Encouraged them to work in groups i.e. discussion groups.
• Avoid being discouraged by boys.

Presentation from Bukirwa Joanita
• Thanked Dr. Betty for sensitizing them in different areas of mathematics.
• She shared with others that she was discouraged by some careers when she was growing for example teachers, but she realized it was not true when after starting her course.

Challenges
• They do not know how to apply mathematics.
• They are biased.
• Mathematics has some hard and complicated topics which require much time to be taught than they are given.
• Some lecturers do not know how to handle slow learners.
• Unfair retakes are given to students.
• There are no corrections made to course work tests.
• Some lecturers despise and discourage them especially the retakers ie they are sometimes isolated from others.
• Some results get misplaced especially those for minors.
• Sometime results are not released in time.
• Boys use girls instead of helping them.

Comments from Dr. Betty
• She informed students that there are not unfair retakes because students do not write names on their answer sheets, their answer scripts are always marked by both internal and external examiners.
• Informed students that there are applications of mathematics for example in research, medical, statistics etc.
• She noted that there were many issues with retakes, but efforts were being made to manage the situation.
• Those who do not get results are always book bank defaulters or may be sit with wrong group where they do not belong.

Presentation from Sanyu Vision (Educ, Math & Econ)

She thanked God and advised everyone to put God first before anything.

Challenges

• Mathematics requires a lot of concentration.
• Ladies hate stress and give up so easily.
• There is limited work for girls in science line because great jobs are especially manly in nature.
• Science course are expensive.
• Many womanly challenges
• Lack of parental support
• Girls do not believe in themselves.

Suggestions

• Form school clinics especially in primary and secondary schools to spread the gospel about science through career guidance.
• Student were advised to reduce time on social media and concentrate on their goals ie by doing what is right at the right time, place and in the right way.
• Retain more female teachers to inspire more girls to science.

Presentation from Nazziwa Carol (Math and Chem)

She shared her history.

She started loving mathematics in senior three and she dreamt of becoming a doctor but to her surprise, she was given (chem/Math). She was not happy at all. Due to the inspiration by Dr. Betty she started loving mathematics and now performing well.

Challenges

• Girls lack interaction especially with male lecturers.
• Lack of commitment; girls always have self-pity.
• Male students and lecturers despise girls.
• Discouragement from relatives.
• Lack of information about courses in college of natural sciences.
• Discouragement from fellow students (2nd and 3rd years).
• Some lecturers send girls out of the lecture rooms because they do not contribute.
Some girls are moody.
Poor explanations by some lecturers.
Some lecturers just download notes from the internet and do not even edit them.

Comments

- Be committed
- Try to sell mathematics to outside community
- Write a paper and name the lecturer who chases you out of lectures.
- Move with a friend to consult a lecturer.
- Avoid discouragement from other people.
- Advised them to do any course whether minor or major.
- Rotate lecturers.
- Avoid being biased.

Presentation from Oliver Nabuuma (Bsc. Educ)

She confessed that she loved education that she gave it 1st Choice, 2nd Choice, 3rd Choice and Engineering was given 4th Choice. That means she could not miss out education course.

Challenges

- Discouragement from colleagues
- Problems in marking
- Lack of motivation in class
- Mathematics does not show that it is practical
- Destruction by statisticians (ie 49% is being a fool).
- Some girls do not do course work.
- Lack of cooperation amongst students
- The scarely nature of mathematics
- Lack of concentration in class

Comments

- It is all about methodology
- Talk about it with Head of Department
- Learn to apply mathematics

Presentation from Carol Namanya (Graduate Student)

- Mathematics requires hard work
- Few female lecturers (gender sensitivity) in the department
- Set goals and work hard to attain them.
- Fear to fail publically
• Everyone sees things differently

Way forward

• Congratulated Dr. Betty for such opportunities.
• Departmental platforms with all information required especially internships, scholarships and other opportunities and updates.
• Continue consulting each other; boys and girls as brothers and sisters to learn more in different fields.
• Emphasis should be taken far primary and secondary schools.
• Feel responsible for your lives at campus and after campus.
• Be focused in whatever they do (i.e. putting on min skirts when consulting a male lecturer; avoid shying) be focused.
• Disapprove that mathematics is for men, it is for everyone.
• Give girls a chance to participate in different activities as well as boys.
• Avoid being selfish.
• Love one another for better results.
• This idea should be taken far to primary and secondary to make a good foundation by opening their eyes at early age.
• Organize a career day and have a practical session for mathematics.
• Advise students on the issue of majoring and minoring in first year.
• Advise girls to look for opportunities and use them accordingly.
• Go back to former schools, homes, communities and inform them about the good things in physical sciences.
• Oral tests should be emphasized.
• Avoid being inferior all the time.
• Put love and determination together to become great ladies.
• Some courses are not easy to explain i.e. BSc. Econ (Stat & Math)
• Extend sensitization to communities to be able to reach parents.
• Students should emphasize on understanding but not only result.
• Sensitize primary and secondary schools teachers.
• Learn to present yourself with dignity.

Closing remarks

Go out and grab a chance because nobody will give you one.

Use internet to get more information about physical science, use e-mails, calls etc. to access information.

Look for opportunities, google and get those opportunities.
Be flexible, ie scientific journalists, bankers, translator, statisticians, economics.

**Comments**

All challenges to be presented to people concerned.

Realize all the negativity in you and fight it.

Science is always dynamic.

By the end of the workshop, a total of 416 students had signed the attendance register. During the workshop, more field work was done. This work will be analyzed statistically after the end of year activities.

A few days after the workshop, Makerere University was closed for three months till January 2017. This resulted in missing two seminars and a career day.

When the university was opened, it was not possible to have the seminar in January, as it was announced simultaneously, that end of semester examinations would be start in three weeks, and the second semester would open four weeks after re-opening.

The next seminar was organized end of March 2017 (30th) in Bot Yr. II laboratory. This was aimed at catching up with the lost activities, and reminding the girls of our cause. During the seminar, a date for the next one was set for 20th April, in Bot Yr. II laboratory. This was the most attended seminar with 170 registered attendees. It was quiet overwhelming but the students agreed to participate even with such a stringent budget. Before the seminar and during class visits by the Project leader, students suggested that we could have a bigger seminar and unlimited time, but students would be free to leave if they had a lecture and the seminar was still ongoing. In view of this, the seminar was held from 1:00pm to 3:57pm, when all possible discussions, are arrangements for the May 02-03 Math School were finalized.

The Agenda for the seminar was:-

**Seminar 20th April 2017 BOT Yr. II LAB**

**Agenda**

1. Prayer
2. Communication from Project leader
3. Reactions & Discussions
4. Math School May 02 – 03 2017
5. AOB

1. Students presented a lot of issues, especially with male lecturers.
2. The girls felt bias from male lecturers especially when they ask, or comment on the derived answers during lectures.

3. One girl shared an experience when she was called stupid during a lecture.

4. They felt biased by some male students especially those who marked their scripts – they felt that the boys gave them poor marks for fear of being outscored by the girls.

All these points and concerns were presented to the Head of Department by the Project Leader immediately after the seminar and he promised to address them.

Students suggested a presentation by the Project Leader on application of mathematics rather than teaching. The Projector leader made a brief presentation and promised to give a 30 minute talk during the May 02-03 School.

Students requested the Project Leader to request the Head Department of Mathematics to talk to his employees to refrain from calling them dumb in class. They shared that with too much demanded from their homes (house work), some of them look for their own tuition, other social responsibilities, being called dumb could put an end to their quest for success in mathematics. The Project Leader promised to address it with the Head of Mathematics. This was presented to the head on the same day.

On Career day and field trips, it was agreed that the first week of June should be utilized. A Makerere University bus has been promised by the Principal College of Natural Science. A girls’ school has been identified Nsambya Girls Senior Secondary School and appointment already booked. The career day to showcase applications of Mathematics to real life sciences is tentatively being organized and dates will be communicated very soon.

The May 02-03 2017 Math School arrangements are finalized and expected to be the best. Speakers from Uganda and Nairobi are expected to attend. This time, a total of 30 speakers have confirmed attendance including three Principals, three Deans, two heads of departments, key gender facilitators, and staff of the Department of Mathematics.

So far, 430 students have registered and picked tags. With a very strict budget, we hope that the facilitators bear with us.

**Results so far**

1) **Female empowerment** in the College of Natural Science has been a success, with more girls willing to participate in all activities including college leadership. In the last students’ polls, girls made a record taking College President and College Vice President. This is the first time a female student is College President. As if that was not enough, a female student also won vice presidency -- the college is run by girls. This was due to an empowerment talk I made to each class urging to support each other especially the girls that had shown interest to lead.

2) a) **More female majors in mathematics and physics.** In the current third years, we have more than 18 math/physics majors. A jump from less than five a year ago. These students have also shown interest to continue with graduate studies and I am looking for grants to cater for their
graduate study as they iterated that it would be hard to secure more school funds from their parents.

a) In the current second year, which was year 1 when the project started, we have over 40 students that have expressed interest to major in mathematics/physics.

3) There is better collaboration with the Department of Physics with the Head giving me access and assistance whenever required. He has also continually participated in these workshops and shared the benefits and opportunities of majoring in Physics to the girls.

4) Women in Natural Sciences was launched on October 26 2016 and still operational, but due to no funds to develop it further, it is still lacking and more effort will be directed towards better facilities on the webpage in the nearest future.
MBARARA UNIVERSITY OF SCIENCE AND TECHNOLOGY

UGA:02 RESEARCH GROUP

Group Leader: Edward Jurua

GENDER ACTIVITY REPORT

November 2016
Introduction

Mbarara University of Science and Technology (MUST) was established by an act of Parliament, with the critical venture to develop Science and Technology (S&T) infrastructure for training scientists and technologist in Uganda. As a flagship institution for the development of S&T in Uganda, MUST has an obligation of motivating and interesting students to pursue science subjects and science-related courses at the University and other tertiary institution. However, this has not improved the gender balance in Science and Technology, i.e., fewer female students opt for science subjects and science related course at University and other tertiary institutions. This has a direct effect on the number of female students continuing to study science related courses at postgraduate level.

Although the Government of Uganda (GoU) tried to improve the gender issue in tertiary institutions by awarding very female students extra 1.5 points for admission into tertiary institutions, this has not improved the gender balance in Science and Technology.

In order to increase the number of women working in science and technology, the most important factors are to:

1. Increase the number of women entering science related programs of study at the BSc level.
2. Increase the number of women who continue to study in the fields of science at postgraduate level.
3. Increase the number of women working in the field of science and technology.

With the aim of increasing the number of female students who enrol for Science programmes at both MUST and other tertiary institutions in Uganda and subsequently the number of postgraduate female students in sciences, the Mbarara University of Science and Technology, Women in Science and Technology (MUST WIST), considered three main activities. These activities are:
(i) Outreach programmes to selected secondary schools in Western Uganda
(ii) Conduct a baseline survey
(iii) Organize a conference

These activities were implemented with financial support from the Gender Activity Grand from the International Science Programme (ISP) from Uppsala University in Sweden. The findings from these activities are summarized below:

1. **Outreach Programmes to Secondary Schools**

In order to motivate more girls into pursuing science careers, it was thought right and just to first go back to the roots of growth in the science career. The MUST WIST group and female postgraduate students in the physics department visited three girls’ secondary schools in the Western part of Uganda. The schools are St. Marys’ Girls’ Vocational school, Immaculate Heart Girls’ Secondary School and St. Bridget Girls’ secondary School. These schools were randomly chosen.

Before talking to the students, a survey was done in these schools using simple questionnaires to establish the feelings and thoughts of the girls about science courses and careers. It was found that culture has a large influence on the participation of women in Sciences and specifically in physics. It was observed that close to 95% of the girls believed that the role of a woman was to take care of the family and bring up children as these are gender roles streamlined by culture. From the simple questionnaire, the following are some of the challenges the female students gave:

They are uncertain of their future in Education because they are not sure if they will have money to continue with studies. Some of them are currently on bursary.

Negative influence from the environment. The environment where they live discourages them from the sciences. The feeling is that science related careers are for men and not females.
Some of the concepts in science look to be abstract, particularly in physics. They do not see the application of the physics taught in classroom in real life situations.

The curriculum is too broad. In addition, the textbooks used mainly have examples that depict men doing sciences.

Some teachers do not encourage girls and are not supportive of them. Some have less or no time to attend to the girls.

Lack of role models or mentors. There are not many female teachers teaching the science subjects in secondary schools.

Cultural influence, where girls are brought up with the mentality that the most important aspect for them is marriage and they think that after a certain age it may not be easy to get married.

During the school visits, the girls were introduced to general sciences and why it is important to do science related courses before narrowing down to physics as a study area. Each school was visited two times. The first visit incorporated facilitators from different science fields and it served as a career guidance day. Figure 1 shows some of the MUST-WIST members giving talk to students.

The visits mainly focused on the importance of studying and having careers in science. This included the following:

- The different careers in science
- Attitude and how it affects performance, with emphasis on the sciences
- Life stories by successful female scientists, as a way of motivation
- Simple demonstrations of science.

The talks were very inspiring and inspired the girls and they started to see science with a different perspective as observed in their questions and experiences they shared. Science and science careers now look to them as something that girls can do just like the boys.
The second visit to the schools focused specifically on physics as a career field during which there were a number of activities. These activities include:

Motivational talks on physics, by female physicists.
Simple demonstration on application of Physics in real life, e.g., using the refraction of light in fishing using a spear, how electricity is made, application of pressure in cooking, utilizing energy from the sun using solar panels etc. In Fig. 2, one of the facilitators is carrying out a demonstration for the students.
Talks on Astronomy, e.g., what a star is and our solar system, activities on the sun, star constellations and the ancient people used them to determine season and planting periods.

Sessions where female physicists shared their life stories, the application and importance of physics.

Figure 2. A Facilitator (Pricilla) carrying out a Physics demonstration for students in Immaculate Heart Girls’ secondary school.

2. **Baseline Survey**

A baseline survey was conducted to obtain information regarding the low number of female students opting for sciences at high school level and in tertiary institution. Female scientists already working, both after first degree and postgraduate were also consulted.
regarding the challenges the females face regarding postgraduate studies. Officials from the Ministry of Education, Uganda National Council for Higher Education, Uganda National Council for Science and Technology and the National Curriculum Development Center were also consulted. The following are the reason given as to why the number of female students in sciences is low:

The Science curriculum being too broad and abstract. There are also a number of repetitions in content in the science subjects, e.g., repetition in content between physics and chemistry, mathematics and physics, etc.

The attitude of the community and some teachers towards girls pursuing studies and careers in science. They think that some of the science careers are only for men, e.g., engineering, where people may have to climb on a building or a pole, construction work etc.

Cultural issues. Both the girls and the society believe that a woman must get married early and the main responsibility is to take care of the family, and bring up children. A girl is considered to be successful if she gets married early and produces children. The girls also believe that if they are more educated than men, it may be most likely that they may not get a man to marry.

Lack of motivation from parents and teachers. In most families, parents tend to pay more attention to the education of the boy child than the girl child. Most domestic responsibilities, e.g., cooking, washing, cleaning the homes, collecting firewood are given to girls, while in most cases, the boys are left to concentrate on studies when they come home after school. This tends to discourage the girl child.

Access to equity in science education. There are cases were the society, policy makers and even some teachers do not give equal opportunities in science education for both girls and boys. They tend to favour boys more than girls.
The nature of Science and inquiry. Genuine scientific inquiry in school science is not encouraging at all levels as a means of giving students experience of scientific procedures that characterize the nature of science.

School textbooks and other curriculum material present another form of gender stereotype. In these materials there is a tendency to present women in a biased way, primary as mothers, homemakers, and care givers. This discourages the female students from pursuing postgraduate studies and careers in science.

The authorship of the recommended curriculum textbooks seems to reinforce the gendered subject preferences. For example, the authorship of most textbooks of primary is predominantly male for mathematics and science, while female for English and Social studies. This imbalance sends a message that mathematics and science are for the male gender, while English and humanities are for the female gender.

3. **Gender Equity in Physics Conference**

After the School visits and baseline survey, a conference was organized to discuss challenges women face in Science and possible solutions. This was base on the findings of the school visits and the survey. The participants of the conference were drawn from selected secondary schools in Western Uganda, Universities, students who completed BSc and have not continued with postgraduate studies, graduates of Science, Science lecturers, and the MUST WIST group (Figure 4). Some of the key topics discussed during the conference are: Gender and Science; Gender perspectives in other natural sciences; Curriculum related issues and how they affect empowerment of females in Science and Technology; Perceptions, Attitudes and performance in Physics; Being accomplished in Sciences; and Female Empowerment in Science and Technology and Academia. Most of the facilitators were female scientists. In Figure 3, Grace Kagoro, an Associate Professor of Biology, in the faculty of Science, in MUST is giving a keynote address during the conference and Mr. Atibuni Denis Zam from Busitema University is giving a talk on “Perceptions, Attitudes and performance. Gender Equality in Focus”
Figure 3. Top: Keynote Address on Gender and Science given by Grace Kagoro; Bottom: Atibuni Denis Zami giving a talk on “Perceptions, Attitudes and performance in Physics. Gender Equality in Focus” during the conference.

The following are the resolutions of the conference:

(1) Science in Schools and its Educational purpose: As a first priority, the policy makers should consider the educational purposes that S&T education can best
provide for students as they move through the education (schooling) stages. When these particular purposes have been identified, curriculum designers should take these into consideration. They should come up with the relevant and adequate content for a particular level and the teaching method appropriate for that particular level.

(2) The current curriculum for secondary schools should be changed. The content should be reduced to meet the specific needs of the society, and cases where there is overlap should be looked into. The different abilities of the learners and gender disparities should be taken into account. The content should also relate to life experience that relate to the real life situations. In the early years, the opportunities that S&T education offer to develop the natural curiosity and creativity of the young child should be considered in the development of a curriculum. Practices that inform students and the society about exciting prospects of science-based careers should be developed.

(3) The authorship of textbooks should be looked into. This should depict gender equity and examples and illustration should demonstrate that women have equal potential in science and technology as men do. Science textbooks authored by female scientists should be encouraged and female scientists should also be encouraged to author science and mathematics textbooks.

(4) Sensitization workshops/conferences should be organized to education the society about the importance of the girl child education. Their cultural perception that women should get married early and bring up children should be changed.

(5) Continuous career guidance should be provided to the girl child. They should be given more opportunities to interact with female scientist through programmes like the school visits. The schools visits should be at least twice a school term. The female science teachers within the schools should counsel the female students as often as possible.
(6) Access and equity in science education: The girl child should be given equal opportunities like the boy child. In the case of funding, more priority should be given to the girl child in order to motivate them. Professional development priority should be given to raising the content knowledge and confidence to the girl child. This could also apply to the weaker boys as well. Policy makers should review the participation of boys and girls in S&T, and seek to implement actions that will reduce the explicit and implicit factors that still disadvantage girls in their access to the fields of S&T.

(7) The nature of Science and inquiry: There should be a balance between teaching science as established information and features of science that are referred to as the nature of science. Genuine inquiry in school science should be encouraged at all levels as a means of giving the girl child experience about scientific procedures that characterize the nature of science. The experience of scientific inquiry and its extension to real life situations will ensure the important interplay of S&T with other types of knowledge and the values they have in society.

(8) Tell your success story: There is need for the female students in secondary schools to get to know that there are female scientists who are successful in life. In this case, the successful female scientist could write their success story and this could be published in a book that can be distributed to secondary school libraries.

(9) Gender equity workshops/conferences. Such workshops/conferences should be organized more regularly and more stakeholders should be invited to participate. Government agencies and policy makers should also be encouraged to attend such workshops. The outcome of such workshops/conferences, particularly the resolutions should be disseminated to the relevant authorities for implementation.
Conclusion

There is need to change the current feeling and attitude of female students in science and science related career. An appropriate understanding of science and a more positive engagement of the girl child must be developed. Curriculum related issues should be appropriately addressed in order to bring on board the girl child during curriculum design and development at all levels.
Acknowledgements

The International Science Programme for financing the activities through the gender grants; St. Bridget Girls’ secondary school, St. Marys’ Girls Vocational School and Immaculate Heart Girls Secondary school for allowing the school visits in their school.
All the people who contributed during the survey.
REPORT ON THE 1ST SCIENCE CAMP FOR A-LEVEL FEMALE STUDENTS TAKING MATHEMATICS AND PHYSICS SUBJECTS” HELD IN DAR ES SALAAM TANZANIA FROM 5-11 JULY 2016.

The camp was held at the Physics and Mathematics Departments buildings at the University of Dar es Salaam, Tanzania. Participants were students from four high schools in Dar es Salaam. These include Tambaza High School, Benjamin William Mkapa High School, Temeje High School and Barbro High School. The camp was officially opened by the Principa of the College of Natural and Applied Science accompanied by the Director of Gender Center, University of Dar es Salaam. Female students were accompanied by their teachers with exception of students from Babro who participated only one day (on the opening day). Facilitators were Lecturers from Mathematics and Physics Departments, University of Dar es Salaam.

List of Students participated in the Science Camp held on 5-11 July, 2016

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<th>S/N</th>
<th>NAME</th>
<th>NAME OF SCHOOL</th>
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<tr>
<td>1</td>
<td>Rhoda E. Mwombela</td>
<td>TAMBAZA HIGH SCHOOL</td>
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<td>2</td>
<td>Latifa A. Mbaga</td>
<td>TAMBAZA HIGH SCHOOL</td>
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<td>3</td>
<td>Scolastica J. Lukoo</td>
<td>TAMBAZA HIGH SCHOOL</td>
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<td>4</td>
<td>Glory K. Cuthbert</td>
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<td>Joan P. Makala</td>
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<td>Liku K. Chenge</td>
<td>B.W. MKAPA HIGH SCHOOL</td>
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<td>Khadija O. Ismail</td>
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<td>Clarina S. Kabyemera</td>
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<td>14</td>
<td>Hawa H. Hassan</td>
<td>BARBRO HIGH SCHOOL</td>
</tr>
<tr>
<td>15</td>
<td>Gladness Peter</td>
<td>BARBRO HIGH SCHOOL</td>
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List of Secondary School Teachers

<table>
<thead>
<tr>
<th>S/N</th>
<th>NAME</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Hiza S. Kibunde</td>
<td>Tambaza High School</td>
</tr>
<tr>
<td>2</td>
<td>Ms. Mwakitalima Elizabeth.</td>
<td>Tambaza High School</td>
</tr>
</tbody>
</table>
3 Ms. Augoss Moshi Benjamin W. Mkapa High School
4 Mr. Ally Idd Iboni Temeke High School
5 Mr. Gebo S. Lugano Benjamin W. Mkapa High School

List of Facilitators:

<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Department/Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Prof E. Mureithi</td>
<td>Mathematics Department</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Mkandawile</td>
<td>Mathematics</td>
</tr>
<tr>
<td>3</td>
<td>Dr. M.E. Samiji</td>
<td>Physics Department (Gender Focal Point, CoNAS)</td>
</tr>
<tr>
<td>4</td>
<td>Dr. I.N. Makundi</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Dr. N. Mohamed</td>
<td>Physics Department (Chairperson)</td>
</tr>
<tr>
<td>6</td>
<td>Dr. N. Mlyuka</td>
<td>Physics Department</td>
</tr>
<tr>
<td>7</td>
<td>Mr. H. Mtelela</td>
<td>Technician, Physics Department</td>
</tr>
</tbody>
</table>

At the end of the camp students filled evaluation forms and were issued certificates of attendance.

PHOTOGRAPHS TAKEN DURING SCIENCE CAMP

Group photo with Principal of CoNAS Prof. T. Lyimo
High School Female students during opening ceremony
EVALUATION FORM

Training Title: SCIENCE CAMP FOR A-LEVEL FEMALE STUDENTS
Date Attended: 11 – 15 JULY 2016

Please rate the content and structure of the training:

Please select by putting a circle the rating for the each section based on the following criteria: 5=excellent  4=good  3=average  2=fair  1=poor.

1. The usefulness of the information received in training. 05 04 03 02 01
2. The structure of the training session(s). 05 04 03 02 01
3. The pace of the training session(s). 05 04 03 02 01
4. The convenience of the training schedule. 05 04 03 02 01
5. The usefulness of the training materials. 05 04 03 02 01
6. Was this training appropriate for your level of experience? 0Yes 0No

If you said “No” to #8, please explain:

Open-ended comments (use the back if you need more space):
7. What did you most like about the training?
8. What can be improved with regard to the structure, format, and/or materials?
   …………………………………………………………………………………………………………………
   …………………………………………………………………………………………………………………
   …………………………………………………………………………………………………………………
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   …………………………………………………………………………………………………………………

Your Name: ___________________________________________ (Optional)
THANK YOU.
COMMENTS FROM STUDENTS AND TEACHERS FROM EVALUATIONS FORM

<table>
<thead>
<tr>
<th></th>
<th>05</th>
<th>04</th>
<th>03</th>
<th>02</th>
<th>01</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The usefulness of the information received in training</td>
<td>15</td>
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<td>0</td>
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</tr>
<tr>
<td>2. The structure of the training session(s).</td>
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<tr>
<td>3. The pace of the training session(s).</td>
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<td>0</td>
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<tr>
<td>4. The convenience of the training schedule</td>
<td>10</td>
<td>6</td>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>5. The usefulness of the training materials</td>
<td>13</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Was this training appropriate for your level of experience?</td>
<td>YES</td>
<td></td>
<td></td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

MORE COMMENTS:
1. Duration of the camp was short should be increase
2. Time is limited which results in missing some good concepts
3. The program should be continuously conducted so as to make sure many girls take physics and mathematics in the university
4. Time should be increased because the time allocated is too short and at school we do not learn some important topics
5. One week is not enough to cover all topics. The training can be conducted during semester break when we have more time.
6. More practical sessions is needed time is too short.
7. The training can also be done to our teachers (Training of Trainers) since our second sys dschool teachers need training as well.
8. Number of days should be increased.
9. The training is very good, it provides new teaching approach we teachers benefited a lot but the time is too short.
10. Interaction with facilitators was good but time is too short.
11. Notice should be given to students before lessons because the time is too short.
12. Teachers are good in training and demonstrations were good but time was short.

In conclusion, the camp was successfully conducted with the following observations:
Time was not enough to cover all topics including practicals and the money allocated was not enough to cover all aspects of the camp.

Suggestions: From students’ comments, we humbly request ISP to consider these activities as very important. The proposal sent indicates three camps in a year but we ran only one. We would like to run the remaining camps so that we can have close follow-ups of students who attended the 1st camp and build a good foundation for those who will follow.
<table>
<thead>
<tr>
<th>MONDAY</th>
<th>ACTIVITY</th>
<th>RESPONSIBLE PERSON (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:00 - 09:00am</td>
<td>Registration and Meeting with Teachers</td>
<td>Students, Teachers &amp; Facilitators</td>
</tr>
<tr>
<td>09:00 - 10:00</td>
<td>Physics - Magnetic Field</td>
<td>Dr. N.K Mohamed &amp; Mr. Mtelela</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>BREAK</td>
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<tr>
<td>10:30 - 12:30</td>
<td>MATHS</td>
<td>Mr. Mkandawile</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
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<tr>
<td>14:00 - 16:00</td>
<td>MATHS</td>
<td>Prof. E. Mureith</td>
</tr>
<tr>
<td>TUESDAY</td>
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<tr>
<td>08:00 - 10:00am</td>
<td>PHYSICS - Magnetic Force</td>
<td>Dr. NR. Mlyuka &amp; Mr. Mtelela</td>
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<tr>
<td>10:00 - 11:30</td>
<td>OPENING CEREMONY</td>
<td>Dr. M.E Samiji (Gender Focal Point CoNAS)</td>
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<tr>
<td>11:30 - 12:30</td>
<td>PHYSICS - Magnetic Force</td>
<td>Dr. N.K Mohamed &amp; Mr. Mtelela</td>
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<td>12:30 - 14:00</td>
<td>LUNCH</td>
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<td>10:00 - 10:30</td>
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<tr>
<td>10:30 - 12:30</td>
<td>MATHS</td>
<td>Mr. Mkandawile</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>14:00 - 16:00</td>
<td>PHYSICS - Electromagnetic Induction</td>
<td>Dr. M.E Samiji &amp; Mr. Mtelela</td>
</tr>
<tr>
<td>THURSDAY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:00 - 10:00am</td>
<td>PHYSICS – Semiconductor-</td>
<td>Dr. M.E Samiji &amp; Mr. Mtelela</td>
</tr>
<tr>
<td>10:00 - 10:30</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>10:30 - 12:30</td>
<td>PHYSICS - Transistors</td>
<td>Dr. I.N. Makundi &amp; Mr. Mtelela</td>
</tr>
<tr>
<td>12:30 - 14:00</td>
<td>LUNCH</td>
<td></td>
</tr>
<tr>
<td>14:00 - 16:00</td>
<td>MATHS</td>
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<td></td>
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<tr>
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<td>MATHS</td>
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<tr>
<td>10:00 - 10:30</td>
<td>BREAK</td>
<td></td>
</tr>
<tr>
<td>10:30 - 12:30</td>
<td>PHYSICS- Logic gates</td>
<td>Dr. I. N. Makundi &amp; Mr. Mtelela</td>
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<tr>
<td>12:30 - 12:40</td>
<td>Filling evaluation forms</td>
<td>Students</td>
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1st Science Camp for Female Students, Taking Physics and Mathematics, 11 – 15 July 2016
at Physics Department, University of Dar es Salaam, Tanzania

**BUDGET**

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<th>ITEM</th>
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<td>Preparations</td>
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</tr>
<tr>
<td></td>
<td>-School Visits</td>
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<tr>
<td></td>
<td>-Administration</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Preparation of Curriculum and Laboratory Activities</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Lunch and drinks</td>
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<tr>
<td></td>
<td>Opening Ceremony</td>
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<td></td>
<td>Lunch for 27 people @ 3.00USD x 5 days</td>
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<td>3</td>
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<td></td>
<td>Transport for 5 teachers @8USD x 5 days</td>
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<td>4</td>
<td>Teaching Allowance</td>
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<td>Teaching allowance for 6 hrs @ 25USD x 5 days</td>
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<td>Technical allowance for 7 hrs @20 USD x5 days</td>
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<td>5</td>
<td>Teaching materials</td>
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<td></td>
<td>-Stationeries, Photocopies and hand outs</td>
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<td>6</td>
<td>Closing ceremony</td>
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<td></td>
<td>-Certificates</td>
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<td>-Photo frames and editing</td>
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<td><strong>TOTAL</strong></td>
<td><strong>USD 2454.00</strong></td>
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Dr. Najat K. Mohammed
Chairperson, Organizing Committee
Promoting for career advancement in basic science through mentorship and training.

International Science Programme (ISP) at Uppsala University got a grant for a project with title: “Promoting for career advancement in basic science through mentorships and training”.

ISP is a unit at Uppsala University that has worked with research capacity building in mathematics, physics and chemistry in low-income countries since 1961. The proportion of women among academic staff at ISP supported research groups and networks is very low, not strange considering that females are often missing already at the undergraduate level. For addressing this imbalance ISP started in 2014 a more focused work on gender equality, promoting activities for improving access of female students to higher education in science and access of woman researchers to staff and leading positions. The application was a first attempt for increasing the competence, awareness and self-esteem of students and staff in ISP supported groups by establishing local networks of female researchers and students, working together for a more active participation of women in research and research management at their home institutions.

This grant has been used for organizing a summer school that was attended by five members (three students and two researchers) from ISP supported groups in Kenya and Uganda. Due to the budget cut with respect to the application and to the possibility to join another similar project running during the same period, the project was partly modified from its proposed form but still succeeded in reaching its goals.

**Project description**

The project coordinator and responsible, Carla Puglia, is working both at ISP and as Senior Lecturer at the Dept. of Physics and Astronomy (IFA). The Department of Physics and Astronomy and ISP jointly organized a summer school with the title “Diversity in the Cultures of Physics” which is a recurrent school organized with the Freie Universität in Berlin, Germany. Joining the projects and sharing the organization responsibility of these schools, was considered a really good opportunity since they had same goals: increase the awareness of female students and researchers about the gender bias women meet in academy, increase their competence and self-esteem, offer networking possibility among students and researchers. The participants from ISP supported groups in Africa could then contribute to the international character of the cultures in physics but also the participants could get more out of networking nurtured by the school. We also saw the possibility to share and get more profit of the available resources, which resulted in a more interesting and revitalized school.

The summer school run over the whole of August, 2 weeks in Berlin, Germany and 2 weeks in Uppsala. ISP and the members from the African countries participated in the two weeks the
school was running at Uppsala University. We had 21 participants in total, 8 from Sweden, 8 from Germany, 3 from Kenya and 2 from Uganda.

The school offered the chance to learn (and get aware) about the role of gender and diversity in the cultures of physics though lectures and workshops with scientific, communication and gender equality contents. It also offered, through visits to research facilities and groups (both at UU and at Stockholm University), the possibility for the participants to establish new contacts and build networks in physics which may result in future collaborations and stays abroad for example when the students will be pursuing their post-graduate projects.

The idea was to include the participants from Kenya and Uganda to this school to increase the networking capability both among the participants and with established senior researchers. Moreover, ISP contributed to the school by proposing and organizing gender lecturing at Uppsala via our collaboration with the Centrum for Gender research. We proposed then the following seminars:
Master suppression technique (Mikael Landsten, UU),
Privilege Walk (Staffan Andersson, UU) and
Critical Perspectives on Physics Culture and Epistemology (Anders Johansson, UU),
The seminar about “Being PhD and working for industry “by Emmanuelle Göthelid (Sandviken) showed possible career paths outside the university after graduation. Moreover, the school included a workshop about presentation techniques, given by Cecilia Öman, also employed at ISP.

The students spent two days at a research group at the Dept. of Physics and Astronomy, UU then they gave a presentation about the project they were assigned and worked with during their stay. Two of our participants, Dr Betty Kivumbi Nannyonga, (Uganda) and Dr Alix Dehayem (Kenya), both senior researchers from Uganda and Kenya, respectively, presented their own experience as women scientists and their research programs at their home universities.

The summer school was a very nice moment to interact with our overseas colleagues and students and for them was an important chance to meet and get to know each other.

From the evaluations we got from our (ISP) participants we can conclude that the most appreciated part of the summer school were the gender workshops and the workshop on presentation technique. The Master suppression technique was acknowledged as a unique and unforgettable experience.

We can say that looking at the goals we had in the proposal the project has succeeded. The participants from ISP supported groups have confirmed that the school has “opened their eyes” about the biases they have experienced without being able to name them. The Master suppression technique workshop has been a very important part of this experience.
Moreover, a very important and positive consequence for ISP is that the participants from our supported African groups, have stayed in contact with each other after the school. Betty Kivumbi Nannyonga has organizes, at her home university (Makerere University, Uganda) a workshop at on 25 of October for female students in mathematics and physics, and two of our three participants from Kenya attended and met again with Betty. Moreover, the Kenyan colleagues are joining a bigger local network of Women in Science in Africa, recognizing the importance of networks for getting support in their planned work for promoting gender equality at the departments where they work.

**Summary**

In our opinion the main goals of the project have been reached:

- to increase the awareness about gender bias at home universities and in academia in general and to increase the self-confidence and competence of the participants

- to establish a mentorship program among the participants and among senior researchers and students at their home university. This is little different from the goal we proposed in the application, where we mentioned a mentorship among more senior researchers at Uppsala University and the participants. However, the modification of the project and related budget, resulted in a shorter interaction between the research groups at Uppsala University and the participants, i.e. only 2 days instead of 4 weeks as proposed in the application. The positive results of the summer school are that our participants by themselves initiated a mentorship program to support each other and the younger local students at their home universities.

- Improvement of non-academic skills of the participants, through the workshops about presentation technique, gender and cultures in Physics and through science (physics) lectures and projects.

We thank the Parity Equality committee at Uppsala University for giving us the possibility to significantly contribute to an already established summer school, giving it new international, extra-European dimensions by including students and researchers from ISP supported groups.

ISP is determined to support the participants and their groups in their goal to expand the newly established network.
Economy report:

The table below shows the budget and the expenses:

<table>
<thead>
<tr>
<th>Budget (SEK)</th>
<th>Number of units</th>
<th>Expenses (SEK)</th>
<th>Entity that covers the cost (SEK)</th>
</tr>
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<td>Air transport for female students, travel lecturers</td>
<td>48 000</td>
<td>4+1</td>
<td>51 486</td>
</tr>
<tr>
<td>Student allowances</td>
<td>42 000</td>
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<td>28 845</td>
</tr>
<tr>
<td>Local transport for students</td>
<td>2 000</td>
<td>4</td>
<td>-20000</td>
</tr>
<tr>
<td>Accommodation</td>
<td>14 000</td>
<td>4+1</td>
<td>13 624</td>
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<tr>
<td>Food and coffee</td>
<td>10 000</td>
<td>1</td>
<td>1 759</td>
</tr>
<tr>
<td>Remuneration for lecturer (including LKB)</td>
<td>40 000</td>
<td>4./. 2</td>
<td>15 532</td>
</tr>
<tr>
<td>Bench fee for internship to host lab (mentors’ lab)</td>
<td>20 000</td>
<td>4</td>
<td>20 000</td>
</tr>
<tr>
<td>TOTAL</td>
<td>150 000 UU 114 000 ISP</td>
<td>111 246</td>
<td>80 331 30 915 UU ISP</td>
</tr>
<tr>
<td>Overheads Ind. costs</td>
<td>88 000</td>
<td>5 200</td>
<td>5 200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>264 000</td>
<td>116 446</td>
<td>116 446</td>
</tr>
</tbody>
</table>

Table 1: The proposed budget on the left side, and the different expenses covered by the grant (UU) and by ISP, on the right side. Please note that the participants were 5 instead of the proposed 4. Moreover, only two lectures got reimbursement and we didn’t need to pay any bench fees to the hosting laboratories due to the modified program of the summer school.
ISP staff and the 5 participants to the Summer school. From left: Ruth, Lindah, Priscy, Alix and Betty

All the participants to the summer school “Diversity in the cultures of Physics”, Uppsala 2016
More than a technical issue for women in science
A contradictory normative reality at the University of Nairobi

Ida Essner and Sara Hesse
ABSTRACT

Kenyan women carry a lot of pressure from cultural expectations and norms; there are also a lot of prejudices regarding what women are supposed to do. At the University of Nairobi, Kenya, women in technical educations are a clear minority. This thesis aims to illuminate the obstacles women in science face when they pursue higher educations. By illuminating the obstacles the thesis hopes to answer why there are fewer women than men in higher educational levels who choose science.

The study has been conducted as a field study at the University of Nairobi with interviews and focus groups. The interviews were performed with men, women, employees and students to get a broad perspective on how everyone viewed the situation of women in science. The focus groups focused more on the women’s own experiences of being in the technical field. The empirical data has been analysed using theories regarding social constructions, hegemonic masculinity, gender equality and equity. Factors that the thesis concludes to hinder women to pursue science and technology are cultural expectation, the fact that science is considered to be masculine subjects reserved for men. There are also common that early childbirth hinder women from pursuing higher levels in the academia.

Keywords: Gender balance, gender equality and equity, women in science, technology, social constructions, hegemonic masculinity, University of Nairobi, Kenya

Supervisor: Cecilia Fähræus
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Abbreviations

UoN  University of Nairobi
INST Institution of Nuclear Science
B.Sc. Bachelor of Science
M.Sc. Master of Science
PhD Doctor of Philosophy
ISP International Science Program
NGEC The National Gender and Equality Commission
WOSWA Women Students’ Welfare association
1. INTRODUCTION

Throughout history, women in Kenya have been underrepresented in high decision-making positions and have at the same time had less access to education and employment (USAID, 2015). The number of women is declining in comparison to men in higher education, especially regarding technical disciplines at a university level (Webster, K. 2010:19-21). With the goal towards a more gender balanced country the Kenyan government has introduced laws regarding gender equality (Laws of Kenya, 2010:24). During the past years the gender gaps in higher educations in Kenya has narrowed, but that change is not as observable in the field of technical educations as in other disciplines. The low number of women in science is a complex problem and is therefore important to address in order to accomplish any changes (Fox, M. F, 1998:202).

At the University of Nairobi (UoN) the gap is wide between the number of women and men pursuing education in science and engineering (UoN 2012:76-82, 2013:96-103, 2014:81-87). To highlight the gender issues and the problems of gender inequality at the university’s different educations the UoN has introduced a gender policy which everyone is expected to follow since the university aims for gender equality in their educations (UoN, Gender Policy 2008:i).

The government's measures and UoN:s gender policy are however not enough to encourage more women to pursue science and there may be many explanations for this. Even though there are positive changes in the Kenyan school system in general and a greater awareness is brought upon gender equality at the universities, there are still factors that are influencing women not to pursue science even if they actually want to pursue it.

Even if the government and universities aim for gender equality, Kenyan women and men are brought up with traditional, cultural norms and prejudice where higher technical education is not appropriate for women (Ellis, A. 2007:18). It is important that the university environment changes from being a male dominated environment to a gender balanced milieu where men and women have the same opportunities (Coordinator at ISP, 2016-03-08). This study deals with the conflict between cultural expectations and the new demands of society on the observance of equality. This subject is highlighted in order to enable any possible changes in the future.

1.1 Problem formulation

The purpose with this field study is to investigate explanatory factors to why the gender balance is uneven by illuminating possible obstacles that prevent women from advancing in their academic careers within science at the UoN. This study is also meant to illuminate the barriers they might have experienced in the past within their academic career. By making a local context analysis at the Institution of Nuclear Science (INST)
and the Department of Physics at the UoN the study will result in a clear idea about the experiences of the women attending higher technical educations, such as master of science, postgraduate and lecturer in the scientific disciplines at UoN. This study gets its unique character through its specific context at a Kenyan university with main focus on men and women’s perceptions about women in science. Since women in science goes against the norm in Kenya it is also important to highlight the subject at the university. Because by highlighting this subject, women’s situation in the technical fields at UoN is put in focus.

The women studying and working at UoN are able to point out if they experienced any obstacles in their academic career and if they see any problem in advancing in future careers or within the university environment. By combining the insights from both women and men, who are working and studying in the technical field, this study could pin down the reason why there are fewer women than men at technical educations at UoN. To be able to highlight this issue the goal is to promote women's access to education and advancement in their academic career within the technical field.

Moreover the question that is raised to answer the purpose with this study is the following:

- Why are there fewer women than men that advance in their academic career within the technological educations at the University of Nairobi?

The previous question is going to be based on the women's experiences in this study and can therefore be accessed by the following sub-questions:

- What obstacles do women experience when they are pursuing higher technical educations at the University of Nairobi?
- How are women in technical education's perceived?

1.2 Delimitations

This study is based on students, technicians, professors and lectures from the INST, and Department of Physics, two departments with Master of Science students. Therefore this study cannot represent the bachelor programs at the university nor give an accurate picture for all master programs, merely a general point of view. The study was limited to this institution and department because of the number of students at these scientific programmes. Another reason for this limitation was that the International Science Program (ISP) at Uppsala University had reliable contacts at these divisions and ISP recommended that the study be performed there. Lastly, the study was limited to the Department of Physics and the INST because they work with gender balance and because they struggle with low female attendance and keeping women to complete their educations.
1.3 Background

In 2005 the government of Kenya developed a strategy, Vision2030, to transform Kenya into a middle-income country by 2030 (Trustees of Princeton University, 2015:1). The vision is based on three pillars, The Economic Pillar, The Social Pillar and The Political Pillar, which are intended to improve the country in the three different areas (Kenya Vision2030, 2015). According to Vision 2030 the Social Pillar purpose is to improve the life for all the people of Kenya. Within the pillar one of the sub-sectors is Gender, Youth and Vulnerable Groups (Kenya Vision2030, 2015).

At the year 2010 a new constitution of Kenya was introduced; the constitution considered, inter alia in §27 Equality and freedom from discrimination, the gender equality (Laws of Kenya, 2010:24). Throughout this new constitution a two-third-gender principle was established. Even the National Gender and Equality Commission (NGEC) originate from this new constitution whose main mandate is to promote gender equality and freedom from discrimination (NGEC, 2013). The functions of NGEC are, among others, to act in Kenya as a principal organ to make sure that all conventions and treaties regarding issues of equality and freedom are followed (NGEC, 2013).

Furthermore, the NGEC obligation is to ensure that all sectors and actors, in the provisions regarding equality and equity in Vision 2030, are respected and executed within the timeframes (The NGEC, 2013). According to a coordinator at NGEC their annual report, about gaps and gains within gender, shows how many of the institutions that are gender balanced, the commission analyse the annual report and subsequently do an audit to the institution (2016-04-12). If the institutions do not fulfil the requirements they can apply for training in gender mainstreaming and other issues at the NGEC (Coordinator at NGEC, 2016-04-12).

According to the Swedish UN-association (2016) the gender balance in primary schools in Kenya is evenly distributed but the number of females is decreasing in higher grades. Although the number of females in higher education has increased in recent years there is still a larger share of male students (Swedish UN-association, 2016). To overcome the problem with an uneven gender balance, the specific goal for the national universities is to follow their gender policy and as well as meet the two-third-gender principle and work against any kind of discrimination (Coordinator at NGEC, 2016-04-12). For example, in Kenya about 300 women candidates benefit from affirmative action when getting accepted to universities every year (Onsongo, J, 2009:76).

To work with gender issues at the university a Gender policy has been established. This is one of the central documents in the UoNs strategic plan for the gender policy.
The University’s overall aim is to create and sustain a fair and just academic environment where men and women have equal opportunities, voice, rights and access to resources, so that persons of both genders can realize their full potential and contribution within a community of scholars with a culture of mutual respect (UoN, 2016a).

The UoN Gender Policy concerns areas like code of practice and implementation mechanisms, which include role models, university staff awards, gender violence, implantation framework, monitoring and evaluation system etcetera (2008:i). Because of previous inequalities and inequities affirmative actions are used to give privilege to special social groups and at UoN affirmative actions are used at the applications to ensure improved gender balance in the programmes (UoN, 2008:7). According to the UoN Gender Policy the Joint Admissions Board’s (JAB’s) use affirmative action in the admission of female students by lowering the women’s cut-off limit by one point (2008:7). Moreover, this is only a short-term solution at the UoN, which is supposed to be combined with other special measures (UoN, 2008:ii).

Because of a rising need of special consideration in marginalization of female students the Women Students’ Welfare association (WOSWA) was established. The WOSWA is a female student association at UoN which mission is to empower women at the university by increasing their capacity within education and mentoring (UoN, 2016b). The WOSWA aim to improve the situation for female students and improve their self-esteem so that they will aim for higher positions at the university and in society as well as working for togetherness between all the students at the university (UoN, 2016b).

2. THEORY AND PREVIOUS RESEARCH

In this section the theoretical approach of this study will be presented. The theories presented in this chapter will be used as assistance for the analysis and interpretation of the collected empirical data. The chosen theories aim to emphasize gender differences, sex roles and gender unbalance in particular the gender differences women experience in science and technical fields at a university level.

2.1 Social construction of gender and sex roles

The associate professor of media, society and the arts Mary Kosut claims that a social construction is created by the society in order to simplify information into categories, which later on become commonly accepted and practiced within the society (2012:347). Authors within the subject refer to the philosopher in science Ian Hackings scheme, in order to understand and distinguish a social construction, X, from reality (1999:6). This scheme by Hacking describes that X does:

\[ X \text{ does not need to have existed, or need not be at all as it is. } X, \text{ or } X \text{ as it is at present, is not determined by the nature of things; it is not inevitable (Hacking, I., 1999:6).} \]
The professor of philosophy Haslanger agrees that a social construction often is associated with something separated from reality by being based on apparition of reality rather than the reality itself (2012:39). As an example, children learn from early age that there are sex-linked categories involving different attributes for both boys and girls (Kosut, M., 2012:347). Therefore, Haslanger emphasizes that it is important to distinguish sex from gender, from where the gender-norm masculinity and femininity originates. This gender-norm exists so as to assess how well individuals fits their gender role and by extension works within social relations and society. Having established that Haslanger means that the gender-norm captures what kind of attributes are suitable for you depending on what your gender role are in the society; for example doctor, pilot, waitress, plumber, professor etc. are professions with roles that appear to have a point or a purpose. Depending on your gender, you are dissimilar suitable for the different roles according to the general opinion (2012:40-42).

Kosut means that these gender-norms and expectations influence how males and females interact with each other; male communication culture is marked by hierarchism and a way of attaining specific individual goals, whilst the meaning of female communication is of collectivistic nature and implies creating and maintaining relation bonds (2012:350).

2.2 A hegemony discourse with women as a counterpart

Oxford University Press defines hegemony as a term that denotes an unexpressed supremacy from members from a specific social class (2016). This concept is derived from the Italian Marxist Antonio Gramsci, whom means that in a hegemonic management there exists an unfair internalized social order (Litowitz, D., 2000:518). Thus hegemony implies that a social group is suppressed and has an uncertain future (Urbinati, N., 1998:370). A hegemonic discourse originates from the normal behaviour in everyday life; thereby the crowd is perused to submit to the general way of living and ultimately the supremacy class’ unforeseen oppression (Simms R., 2003:465). Because of that, hegemony occurs without anyone's intentions Gramsci refers it as “spontaneous” (Simms R., 2003:465).

Hegemonic discourses are sometimes used as explanations for how and why men are maintaining a dominant social role over women (Connell, R. 2005:1811). When men conduct a hegemonic discourse the term hegemonic masculinity is used (Crawshaw, P., et al. (2010:20). The developed concept, hegemonic masculinity, is often characterized by features like toughness, aggressiveness, emotionless etcetera (Crawshaw, P., et al., 2010:20). Nevertheless hegemonic masculinity is associated with positive attribute like strength, courage, decisiveness and other attributes like individualism, competitiveness and rationality as well (Crawshaw, P., et al., 2010:20). The professor of science Raewyn Connell claims that research on schools show that there has been cases where boys
enforce control of the social life and create hostility against girls and other boys who differ from the masculinity features (2005:1810).

Gramsci states that with such a paradigm of counter-hegemony develops from the suppressed class (Simms R., 2003:465). Universal revolution rises towards the general order through a form of cultural rebellion; such a revolution could only emerge if regular people become inspired to change through identifying themselves with the counter-hegemony (Simms R., 2003:466).

2.3 Women in Science

According to the professor in sociology Mary Frank Fox it is becoming more common for women to choose technical or engineering courses and educations but women are still a minority pursuing doctoral degrees (1998:201). The number of females attaining levels of professional position, recognition and productivity are only a fraction of the number of men in the same positions (Fox, M. F, 1998:201).

2.3.1 Man as the reference point

Odhiambo, doctor in educational leadership and management, states that sex roles, prejudices and expectations on the different genders capabilities have had a great influence on the involvement of women in higher education leadership but also in their access to higher educations (2011:670-671). Gender differences have many different perspectives; one is that women are characterized as different from a masculine norm regarding language, the concepts and qualities where “man” is seen as a point of reference (Fox, M. F, 1998:202). From this perspective women represent a discrepancy from the standard (Fox, M. F, 1998:202). Women in technical fields at the universities and in academics are seen as another factor, something that departs from the standard norm (Odhiambo, G. 2011:672).

Throughout history, universities have been viewed as places of exclusion and elitism (Odhiambo, G. 2011:669). According to Odhiambo the university system was first formed for privileged men, this has however been changing, but some still experience difficulties getting an education at the universities (2011:669). Certain obstacles and barriers for getting a higher education include lack of equal access to education, institutions and cultural barriers that discriminate against different social groups which are underprivileged in society (Odhiambo, G. 2011:669). The discrimination of women is not always intentional, but they are sometimes not encouraged or supported and overlooked in favour for men (Tamale, S. et al. 2000:15).

2.3.2 The exclusion of women

The problem of the exclusion of women in science is explained and described in different ways. According to Fox is this a problem that can be described as individual or
as *structural* (1998:202). The definition of the individual approach refers to women’s individual characteristics, like behaviours, skills, attitudes and performances (Fox, M. F., 1998:202). This indicates that the problem lies with the women themselves and that they also are the solution to the problem (Roger, A. et al., 2000:375). This individual approach suggests that the solution is to prepare women for the technical field by providing them with attitudes, inspiration, experiences and technical knowledge (Roger, A. et al., 2000:372). If the problem is treated more as structural the women’s status depend on factors not related to the women's individual characteristics (Fox, M. F., 1998:202). A more structural definition of the problem features more the settings in which women work and are educated, the tasks they perform plus which positions they hold (Fox M. F., 1998:202). The structural approach indicates that the terms of women are influenced by organizational- and environmental factors, which can exclude them from having the same opportunities as men (Fox M. F., 1998:202). One of these factors could be an unsupportive environment, which could hinder women pursuing what they want (Odhiambo, G. 2011:672).

According to Roger, A. et al. science and technology is not gender neutral and there is no gender balance in this field (2000:375). The field is, among other things, a social construction where women are excluded (Roger, A. et al., 2000:375). The solution for the structural approach is to replace or modify the circumstances for women regarding education and the education environment (Roger, A. et al., 2000:374). The problem with the low percentage of women in the technical field is complex and to notice any significant difference requires changes in many places of society (Wennerholm, S., 2007:12).

### 2.4 Equity and equality in the Kenyan universities

Equity and equality are two concept of distributive justice, based on human perceptions of cultural and legal norms dealing with the allocation of resources (Hysom, S.J. et. al, 2011:1263). Equity means different distribution proportional to people's needs, while equality is equal distribution between people regardless of conditions (Hysom, S.J. et. al, 2011:1264).

#### 2.4.1 Gender equality within an university environment

The concept of gender equality means that all are equals; people should be free and be able to develop into individuals without being limited by the gender roles that dominate the society of today (Svaleryd, K, 2001:67). The Professor of Education and International Development Unterhalter argues that there are some definitions that describe gender equality as equal numbers of men and women, for example, in educations or at a workspace (2005:112). Another definition describes gender equality as equal opportunities, equal access to resources regardless of what gender a person has (Unterhalter, E. 2005:112).
Women’s participation and enrolment in higher education in Kenya sometimes encounter constraints directly related to gender biases (Odhiambo, G. 2011:670). During a long period of time less value has been placed on girls’ education, there has been higher value placed on marriage and motherhood for women (Odhiambo, G. 2011:670). According to Tamale et al. women in higher educations carry the burden of traditional and cultural norms and obligations (2000:16). These obligations directly affect women’s opportunities and freedom to pursue higher positions within the academy (Tamale, S., et al. 2000:16). Women in Kenya pursuing a career in academia must therefore, as they struggle with the male-normed professional world, which the university environment at the moment is, balance it with their personal lives and with the Kenyan cultural expectations of women (Odhiambo, G. 2011:672).

2.4.2 Equity through affirmative actions - lower cut off limits for women

Equity is described as the quality of something being fair or equal; fairness and impartiality, equity is something that is right and fair (The Oxford English Dictionary, 1961:253, 262). Equity is not synonymous with equality, since equity does call for deliberate measures to diminish inequalities, or to deal with factors that cause and maintain inequalities; equity has more the aim to promote fairness and a fairer sharing of resources (Herrera L. M., 2007:323). Gender equity is a process of distributing resources in a fair way between men and women free from discrimination of the sex and gender of the persons (CAAWS, 2013). Equity does not necessarily indicate that the exact same facilitates and resources are distributed between the people, it mean that everyone is provided with the resources to meet their needs and experiences (CAAWS, 2013).

To address severe inequalities and create more equity the use of affirmative actions might occur (Onsongo, J., 2009:76-77). An affirmative action is supposed to be a temporary arrangement meant to assist members of disadvantaged groups to take part in areas where they have been disadvantaged (Onsongo, J., 2009:74). When finally the disadvantaged group has been empowered to a point where an acceptable level of equity has been reached the affirmative action will cease (UoN Gender Policy, 2008:ii). Affirmative action is implemented when an intentional action is performed which gives a disadvantaged group prioritizing in nominations or admissions (Onsongo, J., 2009:74). Nevertheless this does not mean that they do not need to meet the minimum qualifications (UoN Gender Policy, 2008:ii). It implies that if there is more than one qualified person and one of them belongs to an underprivileged group that person gets prioritized (Onsongo, J., 2009:74).

The professor in sociology Oanda, I. O, et al. writes that the affirmative action aims to help women get access to higher educations and create a more equal environment at universities (2008:66). Students entering university through affirmative actions are sometimes considered to be inferior or below standard by other students (Onsongo,
Some equity has been reached through affirmative action strategies increasing the numbers of women gaining access to higher educations (Onsongo, J., 2009:72-73).

3. METHODOLOGY

This section describes the plan for the study; it clarifies how the empirical data been collected and how it has been processed through analysis. First of all information about the country's history, culture, customs and habits will be studied to get a wider perspective and to avoid excessive cultural clashes. Additionally there has been a literature study of the gender situation in Kenya and at universities and especially the gender unbalance at the technical educations at University of Nairobi. Because this is a topical subject, there are a lot of previous researches within the area, which has been used as a complement to this field study.

The participants in this study have been female and male, two bachelors students, 68 masters students, six technicians, three postgraduate, six lecturers, three professors, three doctors, one head of department, one principal of college from the INST and the Department of Physics at UoN. The purpose with the selection of participants has been to first achieve an overall picture, second to immerse in the females experience of the academic environment. The first contact with the UoN was via the preparatory questionnaire “Women in Science” (see Appendix 1) that was emailed to the participants from mailing lists over all student and staff at the INST and the Department of Physics, which were received throughout the ISP. At the UoN the work preceded by interviewing respondents from the questionnaire whom had the opportunity to meet us. The focus group session was assembled throughout contacts at the INST and the Department of Physics.

All participants in the study will be kept anonymous. The reason for anonymity was to encourage everyone to share their experiences without having the fear of being held accountable for something they talked about in confidence afterwards (Wiles, R. et al., 2008:422). The decision to reveal the gender and the occupation of the participant is based on the relevance of understanding how people at the university view the situation and whether it differs between women, men, students or employees.

3.1 Field study

The method of this study was a field study at the UoN where the purpose was to understand why there are few women at the university, both as Master of Science and Postgraduates at the Department of Physics and the Institute of Nuclear Science and Technology. The intent with a field study was to emphasize actors’ roles and provide a comparable picture of reality (Eriksson, L.T. et al., 2011:62-68).
This is a local context analysis where the method mainly is qualitative methods such as qualitative interviews and focus groups. This is a good way of gathering information that contains both personal experiences and feelings (Eriksson, L.T. et al., 2011:62-68). As a complement to the interviews and focus group the study was complemented with a questionnaire as a quantitative method. A questionnaire can result in information that is not revealed in the oral interviewing techniques and is used in this study as a way to gather information before the interviews have started (Trost, J 2012:15).

3.2 Questionnaire

The questionnaire was the quantitative part of this study and works as a complement to the qualitative study (Trost, J. 2012:15). The intention with the questionnaire was to gather information regarding gender equality at the technical departments at the UoN before the field study started. There are some difficulties with questionnaires as a methodology; the construction of a questionnaire is complex (Song, Y et al., 2015:323). If the questionnaire is constructed in a good way it will result in more reliable responses. Therefore it is important to reflect over the order of the questions, the answering opportunities, the participants etcetera, when you use questionnaires as a method (Song, Y et al., 2015:324-325). A well-formulated questionnaire has a strategic and logical order of the questions, the wording of the questions should be light and clear to avoid misinterpretations (Song, Y et al., 2015:324-325). It is also important that the questionnaire does not take more than a couple of minutes otherwise the respondents might get impatient and bored (Song, Y et al., 2015:325).

A questionnaire was formulated together with experts from the Gender Working Group at Uppsala University to get assistance in creating a well-formulated questionnaire. The significance with the questionnaires’ was to collect data of local researchers and students’ ideas regarding how to overcome the gender barrier and their experiences regarding gender balance in the scientific fields at UoN. Questionnaires also provide an opportunity for topics that can be perceived as uncomfortable to talk about, and this method gives them anonymity (Trost, J. 2012:56). This method enabled gathering of information about the gender situation at science educations at UoN before the field study started. The digital questionnaire enabled the possibility of a big range of participants (Kothari, C.R. 2004:100-101). The questionnaire went out to all master students and employees at the INST and the Department of Physics, who had email addresses as contact information at staff- and students lists. The answers from this method are free from the interviewer's bias since the interviewer is not present when the answers are given (Kothari, C.R. 2004:101).

Questionnaires can imply problems as well as positive responses; a low rate of return of responses is one big problem with questionnaire (Kothari, C.R. 2004:101). This questionnaire (see Appendix 1) had however a response rate of above 50 percent (62 responses of 120 requested) and there will not be a statistical analysis of the responses
and therefore the response rate can be viewed as good. The responses are only supposed
to give the general opinion about women in science at INST and the Department of
Physics. When the questionnaire is sent to the participants the control of it might be lost,
there is also an inbuilt inflexibility in a digital questionnaire because of the difficulty of
changing it after it has been despatched (Kothari, C.R. 2004:101). To compensate for
the disadvantages with the inflexibility, the questionnaire was only one part of the study
and the things, which needed clarifications, were later discussed in the focus group
meetings and interviews.

3.3 Focus group

A focus group is a kind of gathering where a question is laid out for the group to be
discussed by the present parties. Researchers for the study do not participate in the
discussion themselves, they observe, listen and conduct the discussion by asking
questions, which are discussed by the group (Kitzinger, J. 1994:103). The advantage
with this method is that it highlights the respondent’s attitudes, priorities languages and
helps to identify group norms. This can result in an insight in the operation of the social
process and can also encourage conversations about embarrassing subjects (Kitzinger, J.

Early on in the study women at the UoN were invited for a free discussion on “Women
in science: Career progression, challenges and obstacles”. This kind of focus group was
performed at the university with a mixed group of women, from students, researchers
and professors. The reason why these meetings were only carried out with women is
because the study's main focus is how women experience their situation as a women in
science; what they feel have helped them in their academic career and what they think
can facilitate for more women to pursue science in higher educations.

In total three different focus groups have taken place (see appendix 3); two was set at
the Chiromo campus and one at main campus. Chiromo is a campus hosting many
technical educations such as physical science etcetera and are located at walking
distance from main campus. The meetings were performed in two separate ways. At
Chiromo campus this study’s researchers worked as moderators. In contrast, the focus
group session at the main camps was organized by the INST; the moderator for the
focus group meeting was a female student pursuing her Master of Science, while the
study’s researchers acted as observers and secretaries in the meeting. The study’s
researchers were free to interrupt whenever there was need for more information. The
questions for the three focus group meetings were:

- What obstacles do you think women experience pursuing a technical education
  or an academic career in physics or mathematics?
- Why do you think there are so few women pursuing higher technical educations?
- What could be the solutions to make higher technical educations more gender
equal?
The moderator distributes the word to each participant so that everyone gets the opportunity to talk and share her opinions and experiences. If some participant wants to fill in or respond to someone's story they got the word by raising their hand and wait for their name to be called by the moderator. The focus group meetings were documented through extensive notes by the researchers; these notes were then elaborated and compared with each other. Focus group meetings can result in more significant data than just the group discussion; the researchers can take part of the answers to the questions, group dynamics, common feelings and experiences (Kuada, J. 2012:96). The three focus group meetings was performed with only women and the subject of women's issues in science felt as an acceptable subject to speak of in these groups since most of them had experienced similar things in their educations. However, Professor of International Management Kuada argues that group pressures can influence some results from these kinds of methods, especially if there are people present with higher social rank (2012:96). The moderator of the meetings ensured that everyone in the meetings had the opportunity to speak up and share their experiences addressed this problem in the meetings.

### 3.4 Interview

Interview is a method where it is possible to gather qualitative data, but interviews can also be used to gather quantitative data (Kuada, J. 2012:98). Kuada claims that qualitative interviews aim to gain insight in the perceptions and experiences of the person being interviewed (2012:98). A semi-structured interview is in contrast to a structured interview a bit more flexible; the questions may vary a bit from interview to interview depending on situation and the person being interviewed (Kuada, J. 2012:113). Nevertheless semi-structured interviews also present both qualitative and quantitative data according to Bryman, Professor of Organisational and Social research (2003:156).

There were however prepared questions (see Appendix 2), but a semi-structured interview provides the opportunity for the researchers to deviate from the original questions and add new questions (Bryman, A., 2003:156). These types of interviews enable questions more suitable after the respondent’s answers which can result in other dimensions of the research than expected (Kuada, J. 2012:113). Kuada claims that a semi-structured interview is less formal than a structured and can feel more like a conversation than an interview; it provides greater opportunities for follow-up questions if the respondent could develop or clarify his or her answers (2012:113). However, the ones being interviewed might be guarded in their responses or not completely honest which can result in misinterpretations (Kuada, J. 2012:100). Since people might be a bit guarded when talking about sensitive subjects the goal with the study’s interviews was
to make them more like conversations, a semi-structured interview, than a strictly structured interview.

This study is partly based on interviews with women, men, students and employees at the UoN’s INST and Department of Physics (see Appendix 3). The aim with the different type of interview respondents was to get a wide perspective of the gender balance at technical educations and a view of women in science. The INST and the Department of Physics represent different types of scientific areas at the UoN and are located at two separate campuses. Both are working with gender balance in their educations and try to encourage women to pursue higher educations in science. All interviews were planned as semi-structured interviews and executed with one main-interviewer and one secretary, the secretary could follow up with questions if something needed clarifications. Otherwise, the main-interviewer asked the questions and the secretary took notes of the respondents answers and reactions. Some interviews were recorded and processed afterwards, others were only recorded through meticulous notes. The collection of data varied depending on the respondent's willingness to be voice recorded. Using interviews as a method opens up for the risk of prejudices in the interviewer's questions and from the respondents answers (Kothari, C.R, 2004:99). In attempts to avoid this, the interview consisted of follow-up questions to clarify the respondents’ answers to minimize the interviewers’ free interpretations.

3.5 Data interpretation and analysis

It is important to emphasize that these are interpretations of their answers, reactions, body language, language and tone of voice, which are presented in this study. Dr. Kothari, C.R. writes about the importance of processing and evaluating empirical data directly after it has been collected. The data collected was thoroughly worked, processed and analysed, through relistening on interviews, transcript and compiled after been collected (2004:73).

4. MORE THAN A TECHNICAL ISSUE

This section contains data of the gender situation within the school system and at the UoN. Furthermore it consists of interpretations of the respondents from the questionnaire, interviews and focus groups at the Department of Physics and the INST. The empirical data is analysed and interpreted continuously with the theory and previous research presented in previous section.

4.1 Gender situation at the University of Nairobi

The gender balance among the graduated awards is based on the Congregation for the Conferment of degrees and award of diplomas at the UoN. The awards regarding the
graduated PhD, M.Sc., B.Sc., Diploma Awards and Postgraduate Diploma Awards are a summation of the graduation from August three previous years. The gender balance of those who graduated at the UoN is unevenly distributed within the university (UoN 2012:76-82, 2013:96-103, 2014:81-87).

Table 1. Gender balance among all the students at UoN (UoN 2012:76-82, 2013:96-103, 2014:81-87).

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<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
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<tr>
<td>Number</td>
<td>3376</td>
<td>2173</td>
<td>5549</td>
</tr>
<tr>
<td>Percent</td>
<td>60,8</td>
<td>39,2</td>
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Table 1 show that the last few years the majority of the students at the UoN have been males. Even so in the overall perspective the university meets the two-third-gender rule. However, the picture of the gender balance at the scientific disciplines at the UoN is even more varying, where the distinction between numbers of women and men in the recent years shows a larger gap (UoN 2012:76-82, 2013:96-103, 2014:81-87).

Table 2. Gender balance among science student at UoN (UoN 2012:76-82, 2013:96-103, 2014:81-87).

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<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
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<tr>
<td>Number</td>
<td>902</td>
<td>373</td>
<td>1275</td>
</tr>
<tr>
<td>Percent</td>
<td>70,7</td>
<td>29,3</td>
<td>100,0</td>
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When asked about the gender balance at the technical departments the women consider themselves to be a clear minority (Focus group 1, 2016-03-30). This is clearly shown in table 2 where less than 30 percent of the graduated are women, which implies that within the science disciplines at UoN the two-third principle is not fulfilled. Subjects like agriculture is more gender balanced and makes the total number seem more equal.
This conceals even larger gender-gaps within other technical subjects, that are not even close to fulfilling the two-third gender principle.

The numbers of graduates are as well considerably higher in the bachelor grades than in the masters. Even within the scientific subjects there is also bias upon the different disciplines; for instance chemistry appears as a soft subject suitable for women while physics are considered hard and as a typically manly subject (Focus group 3 2016-04-11). This is even mentioned by Odhiambo that women in technical fields at universities depart from the standard norm, which is directly related to gender biases (2011:672). That men and women are suppose to be more suitable for a specific subject is what Haslanger refers to a result of a social construction and what the gender-norm attributes that are suitable depending on the gender role in the society (2012:42). Something, that according to Hacking, do not need to have existed and is not determined by the nature of things (1999:6).

Table 3. Gender balance among other disciplines at UoN.

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<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Total</td>
</tr>
<tr>
<td>Number</td>
<td>2474</td>
<td>1800</td>
<td>4274</td>
</tr>
<tr>
<td>Percent</td>
<td>57,9</td>
<td>42,1</td>
<td>100,0</td>
</tr>
</tbody>
</table>

Table 3 present the gender balance among graduates in other disciplines at the UoN which is more consistent, despite that women are still a minority (UoN 2012:76-82, 2013:96-103, 2014:81-87).

4.1.1 The feeling of being the only one

However, the women in science at the university points out that the problems for gender equality in technical educations start in lower levels of the university system; the female bachelor students in physics have it tougher because they are a minority at the university (Focus group 2, 2016-04-08). One bachelor student in focus group 2 described it as hard and uncomfortable to be only two girls in a class with a lot of men, you differ from the group and it is hard to fit in (2016-04-08). If you are the only woman in your class you feel lonely and you might not feel accepted by your classmates (Focus group 2, 2016-04-08). An environment, which can be called unsupportive, is more likely to make a person quit their studies (Odhiambo, G. 2011:672). This was one
reason that almost everyone highlighted, why many women drop out of the technical education is because there are so few choosing technical courses. Focus group 1, 2 and 3 all emphasized the importance of support from the people around you, and if you are a minority or alone you might not have it. However, are you a group of women in the same class or field you can seek support and encouragement from each other (Focus group 2, 2016-04-08). On the other hand one woman described this problem with a behaviour, which sadly is common among women: Women do not help women, in contrast to the men. Men help men. (Deputy Coordinator at ISP 2016-04-08)

With the low number of women in higher positions in the technical fields, the women pursuing their masters or PhD are lacking role models and mentors. There are however more and more women who choose technical and engineering educations, but women with higher academic degrees in science are still a minority (Fox M. F., 1998:201). In focus group 1 the women agreed that it was helpful to have a focus group meeting to learn that there are more women in science that experience similar problems as themselves, and that they are not alone (2016-03-30).

4.2 The men’s point of view of women in science

The opinion about women and men’s equal opportunities for higher education among the men at Department of Physics and the INST is divided. When the question “Do you believe that women and men have the same opportunities for higher education?” is raised the interpretations of the question are divided in two separate ways. One response from the questionnaire, that is more common among the master students, is that women are favoured:

Presently I believe women have more access to education, funding and employment compared to their male counterparts. Campaigns on gender equity have sidelined progression of the male fraternity in favour of their female counterparts and underplayed the role of competitiveness, merit and fairness. (Man, M.Sc. at UoN 2016-02-26)

Having established that, it is not stated that the opinion is shared with all male master students at the technical educations. Conversely some male master students and employees deem that men at the university are privileged. The main reason for this is considered to be slow shading of cultural practice and a common belief is that a woman only needs basic education. It is a difficult venture to accomplish a higher education within physics and a lot of effort and hard work is required. Therefore science and engineering courses are reserved for men and a general opinion among men is that women in science appear masculine and less available.

Men often fear women that are tough and study hard courses. Maintaining a relationship is demanding, if you need to study after school there is no time for socializing and a man does not want that. The men expect a woman's full attention and if they can't give them that they are no good or uninteresting from a man’s perspective. Men want the women who prioritize them. (Man, Employed at UoN 2016-04-13)
It seems like a common opinion that women in science have less time and that they are spending their time on something that might not be expected from them, therefore they are separated from the norm. As Roger et al. claim, there is a perception that science subjects are not considered to be appropriate for women, the subjects are masculine and women in science deviate from standard norm (2000:375). The discrimination of women does not need to be intentional, but women are often overlooked in favour for men (Tamale et al. 2000:15). And because this is something that often happens spontaneous it can be considered to be part of the masculine hegemony at the university (Simms R., 2003:465).

In addition to that the male master students and employees at the Department of Physics and INST mean that because of the cultural norms early marriages and pregnancies is another general common tendency. Another response from the questionnaire means that this results in increased workload as a wife, mother and student and thereby slowing down their academic output. Therefore women are not pursuing their full potential and opportunities to accomplish higher educations. The cultural norms for women can according to Fox be approached as a structural problem because women are influenced by organizational- and environmental factors which might hinder their academic output (1998:202). Women in higher education carry a dual burden of traditional obligations and their academic studies, which directly affect their opportunities to pursue higher positions within the academy (Tamale, S., et al., 2000:16).

4.3 Cultural expectations of a Kenyan women

When the question about the obstacles for women who want to study technical subjects, like physics and mathematics, and what obstacles the women in science at the UoN encountered, were raised, most of them spoke about cultural expectations and norms. It is the environmental- and organizational factors that create barriers, like cultural expectations, for women pursuing higher technical educations (Fox, M. F., 1998:202). The environment where women work and are educated is not beneficial if they should get the same opportunities as men. There are structural barriers in society keeping women out (Fox, M. F., 1998:202).

Many have experienced that there are certain expectations regarding what subjects are appropriate for women to study. Technical subjects are only suitable for men, not for women (Focus group 3, 2016-04-11). One of the participants at focus group meeting 1 said that during her years in secondary school her teacher refused to teach her physics because of her gender (2016-03-30). Prejudice about the different genders ability has a significant influence on women's involvement in higher educations (Odhiambo, G, 2011:670) If the girls and women do not get the same opportunities as the men, they will have a big disadvantage in the technical field (Fox M. F, 1998:202). The general opinion, according to the women in the focus groups, is that technical subjects only are appropriate for men because the subjects are considered to be masculine. This is
supported by Odhiambo who says that factors such as women in technical education and even women at universities are factors that deviate from the norm and what is considered to be the point of reference (2011:672). Another woman described that she developed a more masculine side of herself at the university to fit in a group with only men (Focus group 2, 2016-04-08). Women in physics and mathematics deviate from the norm; women should rather work in an office than with advanced technology (Focus group 3, 2016-04-11). By transforming gender perceptions and change the structures of masculine dominance, which exist in the technical fields at UoN, gender balance and gender equality will improve (Arndt, S. 2002:33).

When women do not conform with what is considered to be “normal” some men’s reactions are described as being hostile or unsupportive of the women in the field of science (Focus group 1, 2016-03-30). A woman described it as: women whom out do “their place” in the society usually intimidate men. (Woman Employed at UoN 2016-03-30). By choosing a technical subject, women are choosing a different course than what are expected of them and they deviate from standard (Odhiambo, G 2011:672). Even Connell means that there could be a hostile milieu in schools for those who differ from the masculinity features (2005:1810).

However, more women spoke about how it probably was the external factors that hindered most women from pursuing higher technical educations, not the university itself. When the women spoke of external factors they mentioned the cultural expectations, wanting children or getting pregnant during the education, the fact that it is not considered feminine wanting to study physics and mathematics and financial problems. The gender-norm that exist in society is to assess how well individuals fit their gender role and by extension works within social relations and society (Haslanger, S., 2012:42). So women in the technical fields deviate from the norm that they are supposed to belong to (Odhiambo, G. 2011:672). In focus group 1 and 2 many of the women highlighted the fact that women and young girls often have more responsibilities towards the family and household chores, leaving them less time to study than the men and boys. This depends upon the cultural expectations of what a woman is “supposed to be or do” (Woman M.Sc. at UoN 2016-04-06). So in addition to their studies they have to help take care of the household, which become a double burden, a burden which the men do not have (Focus group 1, 2016-03-30). The mind-set of people would need to change, and the women in focus group 1 describe this as a real challenge (2016-03-30).

4.3.1 Pregnancies a blessing or a curse?

One factor that complicates women’s education, something that hinders some to pursue a higher level of education, for instance a master's degree or a PhD, is pregnancy during their education (Focus group 1, 2016-03-30). The women in Kenya pursuing a career in academia must therefore at the same time carry the Kenyan cultural expectation of getting pregnant (Odhiambo, G., 2011:672). According to Tamale these
obligations directly affect women’s opportunities to pursue higher positions within the academy (2000:16). At the same time getting pregnant is a bit stigmatized and in most cases classmates and lecturers are not supportive of the woman expecting a child during her education (Focus group 1, 2016-03-30). In focus group 3 it was established that it sometimes happened that women tried to hide their pregnancy from classmates and lecturers, as if getting pregnant was something they were ashamed of (2016-04-11). Focus group 1 and 3 both highlighted the fact that there are not enough women in higher positions that women could turn to for support. Very few male lecturers understand the situation and are described as unsupportive and sometimes even mean (Focus group 3, 2016-04-11). Fox argues that women are a minority pursuing doctoral degrees in the technical field (1998:201). Since male lecturer do not understand the women's situation when they get pregnant, there is a need for more women in higher positions in the academy who can act as role models and support for women (Focus group 3, 2016-04-11). Tamale et al. argue that women often are overlooked in favour of men, but that it might not be intentional (2000:15). It might be a result of lack of knowledge regarding the women’s situation.

4.3.2 A social construction from early age

In focus group 1 and 3 they identified that the problem starts early in primary and secondary school, and that much is based on the fact that technical subjects are for boys. According to Kosut it is a structural problem that children learn from early age that there are sex-linked categories involving different attributes for both boys and girls (2012:347). In focus group 3 they said that everything has to start at home; the girls, and of course also the boys, need to be told that they can do whatever they want (2016-04-11). That is why it is important not to teach a girl-child that they cannot do something because it is not considered to be feminine (Focus group 3, 2016-04-11).

If you are told over and over again that, this is too hard for you, eventually you start to believe it is to hard and you choose something that is considered to be easier. (Woman M.Sc. at UoN 2016-04-08)

To change the girls mind-sets are more of what Fox argues to be an individual problem where the behaviour, skills and attitude of the women need to change (1998:202). Roger et al. argue that girls and women need support to change their attitude towards science (2000:372). Both men and women at UoN were in consensus regarding that there are some prejudices about the technical subjects being viewed as hard and masculine. Some argued that women do not choose to study physics because of genealogy; norms, mind-sets and expectations passed down for generations. In focus group 3 they also agreed that physics and mathematics are considered to be hard and masculine subjects (2016-04-11). The technical subjects have got labels that they do not deserve. The fact that these subjects are considered to be masculine can be deemed to be a social construction, which according to Kosut is engendered by the society in order to simplify information into categories and is generally accepted and practiced within the
society (2012:347). However a women employed at UoN claims that the subjects themselves are not hard, everything depends on the individual's own strengths (2016-04-11). Some individuals have more trouble with the subjects in the humanities, and some easier with technical subjects, and that has nothing to do with gender (Focus group 3, 2016-04-11).

### 4.3.3 Taking care of business

The financial loans, which enable research projects for master student and PhDs, may hamper someone’s possibility to finish their project if the loan runs out before the research is completed (Man Employed at UoN 2016-04-13). This is however an external factor that both men and women experience (Woman M.Sc. at UoN 2016-04-06). The loan often runs out after a period of time, for instance in three years, and if you do not finish your research in this period of time it can be troubling getting a new loan (Focus group 2, 2016-04-08). So if something makes you differ from your research plan, like getting a child, it might hinder you from completing the research on time (Focus group 2, 2016-04-08). In combination with their studies many need to work to be able to finance accommodation and food because their loans for their studies do not cover it. In addition to work and studying they also feel the cultural expectation, like taking care of the family, getting a family of your own etcetera (Focus group 2, 2016-04-08). If they did not need to work during their studies the women in focus group 2 thought that more students would finish their studies on time and more students would graduate (2016-04-08).

### 4.4 The attitude within the university environment

When asked about gender equality and the situation at INST and Department of Physics, people described gender equality as a situation where people have the same opportunities and access to resources regardless of gender or who you are. The few women who had made it to postgraduate level agreed that they are treated in the same way as their male colleagues. Unterhalter defines gender equality in the same way, but claims that equal number of men and women does not necessarily imply gender equality (2011:112). The climate at the university is not ultimate and welcoming for everyone, it can be described as being discriminating against social groups that do not fit in the system (Odhiambo, G. 2011:669).

The same way that they treat men they will treat women because they asked for gender equality. And that doesn’t work well for the women who are in a system built for men. (Woman M.Sc. at UoN 2016-04-06)

One woman describes the experience of being treated equally in the following way: *Gender equality become like a punishment, you wanted to go to school, now why are you complaining?* (Woman M.Sc. at UoN 2016-04-06). In individual interviews with women was it revealed that some of them felt that they had to act like a man to fit in and...
adapt to the system. Haslanger argues that gender-norm captures the attributes, which are suitable on the gender roles in society (2012:43).

Moreover, even if the women are given the same opportunities they feel that they have to perform three times as well as the men to be considered equal and as capable as their male colleagues in their scientific work (Focus group 2, 2016-04-08). The specialized physician Wenneras, A., claims the similar thing; women need to be two and a half times more productive than their male colleagues to be considered as scientific competent as the men (1997:342). Even if it would be equal numbers of women and men in the technical field it would not be gender equality since a definition of gender equality define it as equal opportunities (Unterhalter, E. 2005:112). According to the questionnaire, 53 percent of the women thought that women and men have the same opportunity to higher education whilst 67 per cent of the men had the same opinion. Noteworthy is that many of the men that answered that this was not the case meant that women were favoured because of the affirmative actions, which mostly helped the women.

The fact that some women get admitted to university through affirmative actions, an aim to create more gender equity in a man dominated environment, sometimes result in other students considering them being inferior or below standard (Onsongo, J, 2009:74). If the women also are pursuing a technical education they are discrepancy from the point of reference, which is “man” (Odhiambo, G., 2011:672).

5. CONCLUSIONS

One of the explanatory factors of why the gender balance is unevenly distributed is the social construction that science only is appropriate for men. This prejudice is something that appears to emerge in early age in both boys and girls’ attitudes.

The questionnaire was an important source of information that contributed with a valuable preparatory over all picture and in particular the men’s point of view. Which implies that some men argue that women in science are not appreciated, considering the their own interests. Throughout meetings with focus groups lot of valuable information have been collected about women’s experiences. Among other things women in technical education at UoN are experiencing that they deviate from the norm and are considered to be masculine, which is something that is in line with Odhiambo’s reasoning about women in technical fields (2011:672). Furthermore they are experiencing that within the university they are being treated equal to the men and should be grateful, but it is important to distinguish equality from equity. Gender equality is much more than just equal number of men and women, it is about having the same opportunities (Unterhalter, E. 2011:112).
Moreover women are supposed to adapt to the university environment, which can be interpreted as a masculine hegemony where women are the counter-hegemony. According to Odhiambo this unsupportive and uncomprehending environment could lead to women quitting their education (2011:672). At the same time the women state that something that hinders them to succeed in a male dominated environment is the fact that women, in contrast to men, do not help each other. There is no support; the women perceive each other as rivals instead of team mates.

One other factor that affect women from pursuing higher education is getting pregnant while still at school pursuing an academic degree. On one hand there is a pressure and a glorification of getting married and to create a family. On the other hand the women experience that getting pregnant is stigmatized in the academic milieu. An obstacle for women in higher technical educations are the cultural norms and expectations of the Kenyan women that consider it to be more important to get married and create a family than to seek self-fulfilment trough pursuing their own interests.

Through the experiences of these women it is shown that one reason why there are fewer women in science is that they are facing many obstacles as a result of a slow cultural shading even though many actions towards gender equality has been done. By illuminating the women in science at the UoN and their experiences in a environment built for men, there might be changes in the future which could improve the situation for women in science. And since the discrimination of women might not always be intentional (Tamale et al. 2000:15), it is important to highlight the issues and obstacles women in science face at the UoN.

For future studies it would be interesting to study the situations at lower levels in the school system to determine younger girls’ and boys’ attitudes towards science and technology. It would also be interesting to study other universities to be able to ascertain if the situations and attitudes differ depending on whether the university is located in a city or in the countryside.
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Appendix 1

Women in Science

This questionnaire is part of a pre study to a thesis about women in science at University of Nairobi, carried out by two MSc students in sociotechnical systems engineering from Uppsala University, Sweden. The questionnaire is directed to both female and male students and employees at the University. It covers 21 questions and take approximately 5-10 minutes to answer. Answers will be kept strictly confidential, and will not in any way be personally identified in the report of the study, in statistical summaries or in any other information resulting in the study.

All information will be kept anonymous.

Thank you for your participation!

* Required

First name

Last name:

Email:

Gender? *

- Female
- Male

What region and town are you from?

What is your position at the university? *

- Student
- Postdoc
- Lecturer
- Senior Lecturer
- Dean
- Head of department
- Researcher
- Technician
- Other:

To which department do you belong?

How many persons are there in your research group/class? *

- None, I am working alone
- 2 - 5
- 6 - 10
- 11 - 15
- 16 - or more

How many of them are women? *

Work assignments? 

- Do you take classes, teach, research etc?

For how long have you been at the University of Nairobi? 

Number of years.

Are you part of any boards, committees or working groups at the university, faculty or department level? 

- Yes
- No

If yes, what kind of boards, committees or working groups?
If student, please specify BSc, MSc, PhD etc.

To which department do you belong?

How many persons are there in your research group/class? *
If you are unsure just do an estimation.

- None, I am working alone
- 2 - 5
- 6 - 10
- 11 - 15
- 16 - or more

How many of them are women? *
If you are unsure just do an estimation.

Work assignments?
Do you take classes, teach, research etc?

For how long have you been at the University of Nairobi?
Number of years.

Are you part of any boards, committees or working groups at the university, faculty or department level?
- Yes
- No

If yes, what kind of boards, committees or working groups?
If you are employed please rate your satisfaction with the following:

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<th>Very satisfied</th>
<th>Satisfied</th>
<th>Dissatisfied</th>
<th>Very dissatisfied</th>
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<td>Salary</td>
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<td>Working conditions</td>
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<td>Allocation of work tasks at your department</td>
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<td>Job security</td>
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<td>Opportunity for career advancement</td>
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<td>Degree of independence</td>
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<td>Contribution to society</td>
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<td>Social status</td>
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<td>Distribution of resources at your department (research funds, funds for travel etc.)</td>
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<td>Overall level of satisfaction</td>
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To what extent do you think your current work tasks correspond to your academic qualifications? *

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<th>To a very large extent</th>
<th>To a large extent</th>
<th>To a small extent</th>
<th>Not at all</th>
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How do you expand your professional network? *

- Through colleagues at the same university
- Through the Kenyan Government
- Through established scientific networks
- Through internet
- Family
- I don’t expand my network
- Other: [ ]

Do you believe that women and men have the same opportunities for higher education?

- Yes
- No

If no, what do you think are the main obstacles for women's education?
Would you be willing to meet with us for an interview this spring, (April or May) 2016? *
If you are, please make sure that you fill out your email address so we have opportunity to contact you.

☑ Yes
☑ No

If you would like to add something, please write here.
Appendix 2

1) What do you do at the university?
2) Why did you choose a technical education?
3) How long have you been at the university?
4) After your education, would you consider an academic career at the university? 
   a. Why/Why not?
5) What do you consider to be gender equality?
6) Can you describe the situation of gender equality at the university technical educations?
   a. In what way are the men favoured?
   b. In what way are the women favoured?
7) Why do you think it is that way?
8) Why do you think there are fewer women at technical educations at the university?
9) Do you believe that men and female have the same opportunity for higher educations?
   a. Why/Why not?
10) In what way are men and female students in technical courses treated differently by their teachers?
11) How many of your teachers/professors are female?
12) Do they get help in the same way? And the same amount of help?
13) What could make it more gender equal in the technical educations?
14) Is there anything that you feel have helped you in your education?
15) Is there anything you feel is holding your academic progression back?

Mentorship programme
16) How should a Mentorship programme be organised?
   a. By students, teachers, head of department?
   b. Which women should be included? Should men be included as well in these mentorship programmes?
   c. How would a mentorship programme support and inspire more women to pursue a career in physics?
   d. Would you be willing to support younger students/researchers?
   e. In which way would you mentoring help other females?

Interview questions - employees at the university
17) What do you do at the university?
18) How long have you been at the university?
19) Why did you choose a technical education?
20) Why did you choose an academic career?
Appendix 3

Focus group meetings

**Focus group 1 (2016-03-30)**
15 women present
Employees at UoN and master students
INST, Main Campus

**Focus group 2 (2016-04-08)**
12 women present
Employees at UoN, master students and bachelor students
Department of Physics, Chiromo campus

**Focus group 3 (2016-04-11)**
8 women present
Employees at UoN and master students
Department of Physics, Chiromo campus

Interviews

**2016-04-05**
Man M.Sc. UoN

**2016-04-05**
Woman M.Sc. UoN

**2016-04-06**
Woman M.Sc. UoN

**2016-04-07**
Woman M.Sc. UoN

**2016-04-13**
Woman Employee NGEC

**2016-04-13**
Man Employee UoN

**2016-04-13**
Man Employee UoN

**2016-04-13**
Woman Employee UoN

**2016-04-27**
Woman M.Sc. UoN