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# Analyzing Current Status of Urban Female Undergrads In Labs

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## Abstract

Laboratory studies are crucial for subjects such as Electrical and Computer Engineering (ECE) which is considered to be one of the emerging subjects

of choice among students of Bangladesh. However, a technology divide is observed in the laboratory-based classes where female students are not very vocal or participative as they are in their corresponding theory classes. We have conducted a two year long ethnographic study on students to find out reasons behind such division and possible ways to improve the laboratory education in a way it is inclusive regardless of gender. The journey towards this study along with possible solution approaches that have been tried in

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this time period are presented in this research work.

## Author Keywords

Gender and technology divide; women in lab; laboratory education in Bangladesh; Social perspective in Laboratory education

## ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

## Introduction

In recent years, there have been numerous efforts to increase the number of female presence in technology related fields in educational institutions, laboratories and workforces. Activities include initiatives where events are either female only or require mandatory female presence in groups in workshops, programming events, discussion sessions, conferences etc. This trend is visible even in a developing country like Bangladesh which prides in being visionary to prioritize female issues [free primary education reference]. We take a look at the current status of urban female youth in technology fields through ongoing positive initiatives.

Women facing technology divide is not a new problem. The early leadership of female computer scientists were later dominated by their male colleagues [33] which

continues over social, political and cultural barriers. Gender disparity has been the focus of researchers for long periods of time starting at the beginning of computational studies [18]. There has been an array of research focusing on the apparent fear in women to pursue technology based opportunities [36]. The problem exacerbates in Bangladesh, where a preconceived notion of topics exist which influence a person to choose a particular subject. There has been in-depth studies showing female undergraduates are encouraged to study the social-sciences over engineering sciences [35]. We cover an in depth literature review in the following section.

We focus on ethnography study paired by quantitative analysis of current situation of urban female youth in Bangladesh. We look at the group who are privileged compared to other population groups of Bangladesh and try to shed light on existing opportunities and challenges that still exist in technology related fields.

### **Related Work**

Work focusing on female engineering education is present along with generic research that considers the relationship between women and technology. Some of the research coincides with the work done in this paper. However, unlike previous research, we restrict our work to laboratory education in Bangladesh.

The trend of lower participation of women in Engineering in the UK is shown in a study by Barnard et al. [19]. Despite the general trend towards more women participating in higher education, subject choices remains segregated [20]. There are subjects in which women form clear majorities like education, medicine, languages, linguistics, and classics as

opposed to engineering subjects with only 13% of acceptances were women in 2008 [21]. Some of the reasons researchers [22,23,24,25,26,27,28] attributed to this disparity were: quality of teaching in schools, social skills of the student, presentation of the subject, culture of epistemology -which has been confirmed by our study as well in the perspective of Bangladesh. Some other interesting reasons for the disparity highlighted by Powell et al [29] were: lack of knowledge about engineering occupations even among engineering students, occupational choice being influenced by a certain person's impact in a woman's life and most importantly women holding deep stereotypical beliefs that that men are suited to engineering because of the way the male brain works. Our study also shows such stereotypical beliefs as one of the major causes for the low percentage of women participation in engineering labs. Another study by Masako Hosaka [30] had a similar focus to our study in relation to women's presence in engineering labs in Japan. This study used a qualitative interviewing method of the 32 final-year women engineering students recruited from two moderately selective national universities in Japan. The findings revealed that in laboratories or other group work entailing peer interaction, women had negative experiences with their male peers. Regardless of the female participants', intuitive affinity for engineering, they experienced the laboratory environment as challenging to participate actively because: often being the only woman in the lab (treated as a "token individual"), discouraged interaction between male and female students and lack of confidence among the women in the group. Similar insights came up while we interviewed female engineering students from Bangladesh in our qualitative area of the study



(a)



(b)

**Figure 1:** (a) Mixed Gender Poster Competition, 2015 (b) Female Only Poster Competition, 2012

The story of women and technology is not novel, it has been present all along. Mary Wyer et al. [10] observed how gender plays a role in the context of science and technology related fields. Sherry Tuckle [12] goes back to possible reasons behind gender bias in technology related fields, which is often caused by admonishment. We encounter this scenario when gender differences are coming from family as mentioned by Oyenronke Oyewumi [8].

Recent work presented by Jill P. Diamond et al. [13] illustrates other factors that create technology-divide among women caused by using technology to abuse vulnerability of women. This weakness comes either from the existing differences of women spending less time with technology compared to their male counterparts or it comes from the shock felt after some form of harassment. This scenario is present in Bangladesh as well, where we find technology used to harass college going girls who are considered to be advanced technology users of their generation. Such a shock has serious ramifications, where the girl tends to evade certain mediums of technology in fear of the harassment being reverberated.

### **Female Only Events**

There have been arrangements for several discussion sessions among female undergraduate students in an academic setting. There has been posters at various places which mentions a date and time for female only discussion sessions to make sure the events are visible. We organized several female only discussion sessions inviting female students of Electrical and Computer Engineering department starting from 2012. One of the major female only event included female only poster competition by individuals which again turned out to

have only 7 participants among 400 female students enrolled in the department.

**Experiences:** *We share the key experiences here:*

**Support from Authority:** From the very beginning, every event has received great support from the department along with high level authorities in terms of logistic and small funding to arrange food and beverages.

**Eagerness from Male Students:** Many of the male students have visited the organizing authority and asked for their inclusion so that they can raise their voices regarding various challenges.

**Reluctant Participation of Female Students:** It was alarming to find out very low number of female participation in every event. The very first event was organized on a weekend and the organizers later changed such events to weekdays. However, the number of female presence has always been low.

**Lessons Learned:** *One key lesson to learn here was to extend the current format of female only participation to mixed gender events with mandatory female presence while we could engage female students to actively participate in group activities. At the same time, mixed gender events were participated by the male faculties along with female faculties which again, opens up doors to share the challenges and support them together. We want to pay tribute to one of our colleague whom we lost forever, short after this event.*

### **Mixed Gender Events**

Mixed gender competitions and events have been designed to overcome the low participation from female only challenges. It also mimics the real world scenario

closely which the female students would face in their professional lives. In the competition, we invited group participation with mandatory female presence of at least one author. This competition only had one group with full female presence, others had single female authors. It is important to note that the Male Faculty members of the university joined the event enthusiastically with lots of support.

**Experiences:** We have received positive experiences from many of the students in the department of Electrical and Computer Engineering students.

*Support from Male Faculty Members:* The event was actively supported by many male faculty members along with female faculty members. In female only events, male faculty members often do not participate in discussions anticipating uneasiness.

*Male Dominated Leadership:* One drawback of the mixed gender activity showed male dominance in leadership roles. This is a general problem in group activities and must be considered seriously.

**Lessons Learned:** The mixed gender event was a successful one. However, we have to make sure that female students are able to work with their full potential and confidence along with their male peers in a group setting.

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<https://www.facebook.com/groups/codeitgirl>
2. Code it, Girl *Facebook* [page]  
<https://www.facebook.com/codeitgirl>

## Conclusion and Future Work

Laboratory education itself requires different skill sets compared to traditional theory classes in Undergraduate Universities. In laboratory classes, one has to really think of a solution towards a particular problem, solve the problem, test it - all within the required time of the particular laboratory class. Limited number of instructors often prioritizes to help only few students where female students often fall behind. On top of that, female students have shown a tendency not to share their problems easily. Many factors are at work here which varies from the fear of what others might think of her to not preferring to be visible. Moreover, a male student often is exposed to machineries earlier compared to his female classmates. All these factors affect a particular female student who in turn shows poor performance or performance that is not very enthusiastic. We have spent two years discussing, observing classrooms and working our solutions suggested by the fellow students to improve the situation. Some solutions were straightforward and could be tried in laboratory classrooms while others require awareness generation and long-term changes. However, we consider this work to be valuable as it initiates the conversation where female students are sharing the barriers they are facing. That day is not far where many of the female students will take leadership positions and contribute towards positive changes. A solution local to Bangladesh may pave the way towards a global solution strategy.

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