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Impacting on Gender Equality through a Women's ICT program in South Asia - An Exploratory Study

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Abstract: Educating women for ICT-based change can be seen as an ICT4D intervention. This paper fills the gap in the literature of capabilities and ICT education for gender equality. This is done by a study of the creation of an undergraduate ICT program for women by a higher education institution in South Asia. It is focused on the qualitative, subjective self-assessment of the students. The case is investigated through the capabilities approach as formulated by Sen, and then applied to the higher education sector by Walker. Based on our data, we conclude that through ICT undergraduate programs, it is possible to develop South Asian women with capabilities in programming *and* interdisciplinary liberal arts. The study shows that students remain loyal to their families and acquire more advanced strategies for personal empowerment, not least emotionally. The four years of intervention reorient their imagination in many ways, outlined in the paper. Furthermore, the data points toward the direction that a women's ICT program has positive impact in several ways, but in particular seems efficient in symbolizing progressive women positively on the regional level, and in particular at the local level of communities.

Keywords: Women's Colleges, Gender, Higher Education, ICT4D

1. INTRODUCTION

There is a rich literature on Computer Science (CS) and Information and Communication Technology (ICT) in higher education, and on how the use of ICT affects education and gender. There is also a voluminous literature on capabilities and education (Sen, 2001; Walker, 2006). But in these research fields there is not much being written on how ICT-educational programs can affect women.

Universities can be regarded as drivers of ICT for Development (ICT4D) through developing ICT capacity (Harsh & Zachary, 2013). We want to study this further through focusing on students with ICT-related capabilities. Our particular study is on Asian University for Women (AUW), taking as its mission "to cultivate successive generations of women leaders who possess the skills and resources to address the challenges of social and economic advancement of their communities." (AUW, n.d.a), including women leaders with in-depth knowledge of ICT.

The majority of CS programs in the Global South concentrate on providing the students primarily with subject matter knowledge. There are also some that have a more focused strategy on acting as societal change agents. AUW has since its inception aimed at providing gifted, but educationally and (in most of the time) socially disadvantaged women with a high-quality education. This is not just for correcting the persisting asymmetric access to education. AUW believes that its alumni will go out in society and act as change-makers, undermining the patriarchal structures in South

and South-East Asia. While women's universities is an old phenomenon (Renn, 2014), and the outcomes of such institutions have been debated (Nishio, 2008; Renn, 2014), we do not know enough about the outcomes of such programs in the specific context of CS and ICT. Such knowledge is valuable for institutions that are starting up, and for the donors funding higher education. We believe, this research work will be an important contribution in providing assistance to evaluate the effect of CS/ICT programs in other universities. Such a comparative basis can furthermore helps the potential funders of women education, ICT4D leaders, and policy makers.

This paper moreover aims for providing some inspiration for ICT4D education. In our view, this question cannot be reduced to the level of courses with ICT4D literature in the form of a primer or research papers from good ICT4D journals. It is also a question of sustainability, and sustainability is interconnected to structures of education.

The objective of this paper is *thus to report the outcomes of the Computer Science (CS)-Information and Communication Technology (ICT), hereafter CS-ICT, program at AUW at the individual level*. This is a case from one institution, which brings many of the advantages and limitations for a case study (Flyvbjerg, 2006); in this case it allowed the researchers to trace the complex relations in the group and reach a deep understanding, rather than an understanding of the variance of the impact on female Computer Science graduates across the Global South. However, even if it is a single-institution study there are lessons to learn for those that are teaching and involving female students with similar characteristics in normal computer science or MIS programs. As the graduates are still only in their very first steps in their career, it is still impossible to determine whether this program would impact on the way ICT is built, and thus the study is delimited to the impact on the students. AUW and its CS-ICT program has a unique approach to drive sustainable development through a gender-aware intervention, something we think warrant attention and analysis, and will outline in Section 2.

2. THE SETTING – ASIAN UNIVERSITY FOR WOMEN

Established in 2008 and based in Bangladesh, AUW is a start-up liberal arts university with nearly 550 students from 16 different countries. The primary uptake is from South Asia. The core objective of this institution is to develop women's leadership through interdisciplinary curriculum and community based service learning. AUW select their students based on their merit and also commitment and contribution towards socio-economic development (AUW, n.d.a). The official cost of education is US\$ 12,000 per year for each admitted student. However, the majority of the AUW students till now received financial scholarships and tuition waivers from the university. The university is focused on attracting internationally trained and highly qualified teaching and administrative staff for planning and implementing its programs. All these have made the AUW project significantly costlier than its peer private and public universities in the region.

CS-ICT at AUW aims to educate students who aspire to work in the ICT Industry and Development Sectors. This 4-year program leverages technical ingenuity together with social insights across the disciplines in order to address challenges in ICT4D-relevant areas such as health, microfinance, entrepreneurship, governance, education, and civic activism. CS-ICT envisions the students to work in multi-disciplinary and intercultural teams, delivering global solutions. The vision behind CS-ICT is that it would enable AUW to develop future leaders in the ever growing field of Communication and Computing Technology, empowered with holistic knowledge about global as well as local socio-economic issues, and equipped to solve the related real world problems from the front (AUW, n.d.b).

3. RELATED WORK

3.1. *Related work on capabilities, Gender and ICT*

There is a rich literature on ICT in higher education from a developmental perspective (Georgsen & Zander, 2013; Marshall, Kinuthia, & Taylor, 2009). The use of ICT in higher education and how it brings gender empowerment in a developing context has also been studied (Purushotaman, 2013). There is furthermore a voluminous literature on capabilities and education, but they only discuss peripherally the subject (Walker, 2006). However there is very little being written on how ICT programs can affect development (interesting exceptions being Negash, Watson, & Straub, 2008; Gregory, 2009). Especially this is the case from a capability perspective. Since the capability approach is appreciated as useful to the field of ICT4D, this work will be a valuable contribution to the further mapping of development by ICT in education.

AUW is not alone in including "gender positive initiatives" in their operations. There are no figures of the number of women's colleges in South Asia as a whole, but in India alone there is estimated to be over 2,500 colleges (Radha, 2011). Almost all of them, however, operates under much more humble financial conditions. The ones who also have an attitude-changing (or reinforcing) agenda influence students' values about marriage, career and feminism (Indiresan, 2002, 2011). We are not aware of any research literature that empirically cover the impact of women's universities institutions in the field of ICT. What we have seen in other developing country contexts is that dual-sex universities in current practice can have unequal access to facilities for women, women are underrepresented in their democratic organs, and women become expected to complete their social and family duties, resulting in less time in computer classrooms or libraries (Mhambo-tata, Mlambo, & Mwatsiya, 2009). We have observed widespread inequality in using ICT by women, beyond the education sector as well (Hilbart, 2011; Hossain & Berresford, 2012; Khan & Ghadially, 2010).

Of great relevance to a study such as this one is what will face the students on the employment market. There is limited research in this area in the region of South and South-East Asia. Work from East Africa (Abagi, Sifuna, & Omamo, 2009) indicate that skills is only one factor out of many aspects here, and if university is to be the single most important tool to succeed in the later career, it should hence not focus only on skills development.

3.2. *Theoretical Framework*

This paper follows the capability approach as created by Sen (2001) and then elaborated by Walker (2006) for the context of higher education. The core concept is capabilities, a concept referring to the level of individuals, as skills. More specifically, it refers to skills as a way to reach attainable options thanks to those skills and aptitudes. To this Walker adds capability as opportunity (Walker, 2006), and thus transcend the skills perspective (see also Barnett, p. 440). The proper creation in a society of opportunities cannot be understood from the perspective of a single individual, but rather by relationships between individuals. Walker (ibid) describes this as that the capability approach is "ethically individualistic", but not ontologically so.

The ultimate goal of increased capabilities is the increase of well-being, for self and others. Sen takes well-being to be "the primary feature of well-being can be seen in terms of how a person can function, taking that term in a very broad sense" (Sen, 1985, p. 197). Functions/functioning can be both activities and states of being, such as eating, reading, seeing, or not being ashamed of poverty or clothing. The sum of accomplishments is the "functioning vector", the total well-being. Well-being should not be reduced to pure utility, pure happiness (as a mental state) or desires. It is important that a learner not only gets increased skills and opportunities, but also values them - in that way the capabilities will also be exercised. The focus is on developing capabilities up to a certain threshold level, where well-being starts to manifest (Nussbaum, 2006).

Walker has operationalized the capability approach to a list of capabilities that higher education can and should address at the individual level. (Walker, 2006, p. 121):

1. Practical reason.
2. Educational resilience
3. Knowledge and imagination.
4. Learning disposition.
5. Social relations and social networks.
6. Respect, dignity and recognition.
7. Emotional integrity, emotions.
8. Bodily integrity.

It is useful to apply this framework in order to see whether participation in learning activity orchestrated by AUW is related to development of these capabilities. This framework has been used in our method (see below).

Finally, it can be noted that the capability approach forces us to think what we mean by development through education, and how we should pay attention to the quality of the higher education experiences between students by considering their own perceived achievements, rather than achievement as measured by policy-making institutions or input-output measures, instead of only quantitative studies (Unterhalter, 2003).

4. METHOD

The AUW is interesting as an example of extreme case (Flyvbjerg, 2006) study of what kind of impact that can be achieved under very favorable conditions. AUW has good resources at its disposal. Furthermore, the students are exactly the change agents that a gender-aware ICT4D community would like:

- Intellectually capable
- Educated for leadership
- Women (i.e. addressing the gender skewing)
- Interested in grassroots questions
- Many come from socially disadvantaged backgrounds (class skewing)

Whether evaluation should be made by students, by comparison between institutions, or by experts is a long-standing discussion. Each approach has its merits. We have put emphasis on students' subjective change of motivation in life, and their relationships with their community, where **self-assessment** at this stage tells things that will only be shown after years of performance in subjects' careers. We duly recognize the limitations due to risk of misperception of capabilities. For instance, the students have undergone extensive training in academic English and every student is totally fluent, have competences in understanding western guest faculty, but as we shall see in the next section, they take it for granted and do not see that development. Still, their perceptions will highlight what they value, and many other aspects of capabilities.

We took the first graduate class (16 students) and interviewed 6 students individually, with a duration of circa 1.5 hours each in 2012. Based on the analysis of these semi-structured interviews, we made one additional 2-hour focus group interview with 5 more students (voluntary, and consenting to research participation). The sample was purposeful in both cases, aiming to cover many nationalities, castes, class and academic performance. We aimed to further illuminate specific capability issues that were only superficially covered in the first round. Moreover, the focus group spawned some reactions to individual students' statements. The interviewer was also

one of their past teachers and knew the students well. The interview guide was constructed with departure in Sen's and Walker's writings. The data were coded with a coding scheme with key concepts from the same literature (e.g. #skills, or #change of preferences). In accordance with the dense format of this paper, we have applied a thematic analysis inspired by Braun & Clarke (2006) for the process and presentation of the analysis. We have focused on the results that we found to be most significant, but also repeated patterns across interviews. We have deliberately been quite exploratory (ibid), in order to allow for promising themes in the data, whereas the limitation of such a strategy is that its findings may be relatively tentative and benefit from further inquiry. The themes appeared after our initial rounds of coding, where we saw where the most "dense" material was. Our search for interpretations was guided by a critical realist epistemology. Although the interviewer was an AUW CS-ICT faculty during the interview process, he was not in a position to influence any of the interviewees' academic results.

5. RESULTS

The results were organized in identified themes, and we report the most salient and significant themes below.

5.1 *The Capability of Knowledge and Imagination*

This theme concerns at its core the subject knowledge, the discipline of computer science, but also contextual knowledge of the liberal arts, which AUW is committed to. The students all identify their main knowledge as Computer Science and ICT, despite the liberal arts 'touch'.

The student respondents feel that their main capability being programming and applied areas, such as mobile development. They feel that they have tried working as programmers, so they know what that professional everyday life will be like. Students got inspired in various directions outside core CS, such as e.g. animation drawing. They acknowledge that they are still learning in these areas, and imagine themselves to build further skills in the supporting areas. Interestingly many of them have felt inclination to teach ICT, and apparently have sufficient subject skills to do so. They also perceive themselves to possess much broader and different skills as compared to other CS graduates. A common opinion is that their education cannot be reduced to skills in an area, put best by this student (R5):

"...education not only means having the certificate in any area, it also shapes your life in this way. You have to be capable of identify what's good, what's bad, what's right and what's wrong. And...computer science is a tool. It's like through computer science, you can integrate with any other subjects in any other areas."

The program has made the respondents open to interdisciplinary education, and they are conscious about changes in ethical stances. But ideas related to such multiplicity have some variations. One of respondents (R6) states e.g. *"By studying CS, we think more technically, not the practical way. Practical in the sense that ... other people's points of view. I always like, 'Oh, this is not my topic.' So I avoid that. I don't know how the CS education can change my point of view"*. Hence, this is a matter of personal inclination.

In spite of being from an all-women university, AUW students got rich opportunity of working with male peers between semesters, outside the university. Respondents feel that they have strategies (skills) for talking to people (men and other women) outside their comfort zones, for instance, they learned that it is more effective to prove that they have factual knowledge first, before offering their point on a certain question. They are not uncertain (even they have been in the earlier stages of their education) of their opportunity to exercise their knowledge in debate and discussion in male-dominated workplaces. At the same time, they are well aware the omnipresence of discrimination. But we saw very insignificant levels of resignation.

The respondents say that they do not "know enough" about many curriculum subjects, but they are not able to explicate the threshold level for their skill where they "know enough" to be capable - especially when they have not attained it yet. Their threshold levels become uncertain due to the lack of practice. In it our judgment, it is only sound with some doubt, which arises in every critically minded student from time to time.

Generally, the students feel that education *is* opportunity. They perceive their education as a great resource when getting an internship and their basic training provides them a platform¹. Conversely, beliefs in autodidact alternatives to their path of life are almost absent.

5.2 Influence of Family

Overall, the respondents identified "family" to be a critical factor in their lives. They found family to be a source of positive support as well as negativity. Some of our respondents experienced tension within the household and the larger community for speaking their mind on social issues. The majority of the respondents shared their concerns about marriage and how in-laws family can have negative impact over one's career. To ensure better decision making for the future, many of our interviewees expressed interest to share their own knowledge and experience with the family members, especially the young ones.

In most cases, families were found to be supportive of the respondents' education and future career, even when the surrounding social elements were not that enthusiastic about women's higher education. In general, we found fathers to be the champions of women education and career development. One of our respondents mentioned about her father's perception about an ideal job for her (R5): *"He is very proud of me... My dad is now thinking someday I will work in NASA..."* Another student said: *"With the study and education, he [father] always supports...he also supported my sister."*

The participants highlighted some negativities too from the family front. Some parents were not much enthusiastic about AUW education. According to them, university degrees can jeopardize the girls' prospect of getting good partners with equal or higher profile. In addition, the extended family members, primarily the male members, across the societies our respondents represent, showed negative attitudes towards women education, specifically in CS/ICT/Engineering (R3):

"...once when I was coming from home on a vacation...my uncle made a comment, that it's a good idea for my younger brother to study engineering, but it's not useful for me to study computer science, what I will do and why, as a women, I should go for this one."

The idea of marriage and the prospect of dealing with future in-laws turned out to be major sources of anxieties. Almost all of them believed that marriage can adversely affect their utilization of their education and professional aspirations. They mentioned the traditional social expectations, where the girls live with their in-laws after marriage and the primary responsibility of the decision making on education, work, and other issues lies with the husband and other male members of the in-laws family. One participant of the focus group reflected on her possible helplessness (FG-1):

"...maybe you have some plans, but from your in-laws' side, they are not supportive. You want to study outside, maybe they won't allow you to go outside to study. Or maybe if you want to work, they may not support."

Our respondents also mentioned families, where female education is seen as an opportunity for better jobs - not for greater women empowerment but for meeting the ever-growing demand of dowry. A respondent (R1) shared:

¹There is a tradition in South Asia to train for general skills rather than immediate employability: See e.g. the situation for Indian engineers (Aspiring Minds, 2014)

"So my father usually says you have to find your own money to pay your dowry. So before coming here (AUW) that was what I was thinking. If I want to be successful, I should be able to finance myself and get married"

During this research, we found the majority of respondents to be eventually open on working out possible solutions to this "marriage" problem. Some of them stressed on the importance of achieving independence and getting empowered before getting married, some focused on the value of balancing between professional and private life, and some talked about future "friendly partners", who can support the women in fulfilling their aspirations.

5.3. Change of Preferences

A significant portion of the conversations was about what in Walker's (2006, p. 40) terminology would call adjusting expectations of life. The respondents talked about their own and their surroundings' change of preferences about education, family, empowerment and career. AUW's CS-ICT program helped the interviewees to conceptualize education beyond diplomas and GPAs. They identified the need of being proactive in community works and highlighted that the benchmark of a thriving career not only depends on salary or profit, but also on the level of positive contribution one can have on her society. They acknowledged the importance of inclusiveness, equity, individuality, and critical decision-making.

The respondents now consider an ideal education as an enabler for independent decision-making. Among the regions from where the respondents came from, there are considerable similarities between the expected monotonous goals and singular objectives of education (e.g. getting good grades, finding jobs, etc.). However, the cross and multi-disciplinary nature of liberal arts education introduced to the AUW students' immense possibilities, as evident from the research interviews. One respondent (R1) said:

"my community usually sees education not as understanding each other and looking at life in a different way...AUW education is that it gave me a chance to look into others' lives in a different way, look things in different points of views...it can be from social dimension or economic point of view, those sorts of things...."

The basic aim of education should not be just to get a job, but should also for someone to be able to understand that "OK, these things are happening, what we should do, what sort of difference we can make in our community."

Similarly, the respondents thought that CS-ICT education in AUW has provided something extra, due to its liberal arts nature. It was beyond their expectation and they believe that such experience would provide them a competitive edge over their peers from other CS programs. According to one student (R1):

"When I first started I thought being a computer science major, I will be good at programming when I finish,... but back in Kerala no one teaches what ethics is, what the problems in ICT field are, and how technology can be use for community development...that is the difference AUW brings up."

The idea of a 'successful woman' was also changed for all the interviewees. For them, to become an accomplished woman, one now needs to do more other than just taking care of families and earning money:

"Before coming to AUW, I imagined a successful woman should be married to a good husband, he would have a job, she also needs to have a job. It doesn't need to need to be like a very good job...but after AUW, a successful woman needs to have a career that she loves to do, and she doesn't need to be married." (R4)

In the narratives, we found many of their parents to be at first skeptical about the usefulness of CS or any other technical education for girls. Different social opinion makers even questioned the quality of AUW's CS-ICT education. However, after seeing the gradual positive changes among the students their perceptions altered too. Our respondents' effective approaches on ICT related issues and problem solving exercises were critical in building such positivity. In addition of the formal university education, AUW offered internships for all its students including the Computer Science ones on many leading local, regional, and international ICT organizations. Such exposures assisted our AUW students in mustering more experience, and for expanding their horizons (R1):

"Before AUW education it would have been someone who is working at an outsourcing firm...now it can be in a cyber crime field or in the policy-making field or who can do programming. So I realize that there are much more opportunities for the CS graduates, not just programming."

Beyond career ambition, social calling, or effective learning process, the respondents stressed on their evolved conceptualization of empowerment. Many, in their pre-AUW lives, thought of empowerment as directly equitable with a high paid job, or a state of a society where women feel safe – or were completely unaware. The impact of liberal arts education in CS studies was evident in the interviewees' latest thoughts on empowerment. Some of them think that empowerment should not be confined to traditional success. It needs to ensure the construction of a society where the women are not required to be saved, but will be freely choosing to do something that truly makes them happy. For many, empowerment now means a socio-economic stage that provides the strength to fight against internal as well as external discriminations:

"I think empowerment for women should make her feel that she doesn't need to prove that women can work. She only needs to prove that she can work, as a person..." (R4)

"Empowerment is being independent emotionally, not just financially. Financial independence is a basic form of empowering women, but being emotionally independent is very essential." (R2)

The emergence of all these changes of ideas and multiplicity of thoughts has confused the respondents as well about their future course of action. According to them, their new personal thought-models are at times found to be in conflict with their families' and societies' expectations. Some of the respondents highlighted the challenges they are facing with career choices. They mentioned their fears about confronting the traditional norms to attain their ideal empowerment and career goals. They are now skeptic about settling back in their own societies. These thoughts additionally confirm the changes of preference that took place within themselves.

6. DISCUSSION & CONCLUSION

In sum, we have highlighted how the AUW has developed students with perceived capabilities in programming, yet with an interdisciplinarity through its basis in liberal arts, and have created changed valuations of skills in many dimensions. Unsurprisingly, the family remains salient in our respondents' minds and 5 years on an intercultural campus with countercultural undercurrents has not broken that social bond. Many of the respondents are social "pattern-breakers", but none of them denounce their family; they rather develop strategies "from within" the social system, such as using the career to raise sufficient money for dowry, or moving back to the home region, but sufficiently far away from family in order not to be constantly monitored. Even a progressive intervention such as the CS-ICT program, will cause not only social transformation but also social reproduction (e.g. of the dowry practice) (Renn, 2014, p. 113 ff.). As illustrated, their relationships are mainly positive of ICT education, but also include conflicts.

To Walker's list of capabilities in Section 3.2, we might add a capability in this case – symbolic value. What AUW seems uniquely positioned to do in terms of developmental *gender equity impact*, is to create *symbolic value* - by highlighting capable females. Renn (2014) describes the importance of symbolic function of female higher education generally. It draws attention to the

status of women, existing but also potential, and the changing status. Our empirical material elaborates this function, specifically in the ICT context. The respondents are both oriented towards social change, constructively opposed to family structures and their home regions, and have skills that will actually make them professionally capable to make a difference, perhaps also rising in the ranks. While we do not want to fetishize “the career”, it is a fact that graduates with prestigious titles and high salaries will function as a symbol. Some people with orthodox mindset in the students' home regions may adjust their interpretations on the limits of what women are able to accomplish.

AUW can never reach massive impact, as the number of women is so large in the region. Due to AUW's high costs per student, the model does not scale, but this a limitation, not a weakness. We think that symbolic value may one of AUW's most important developmental functions; showing the local communities and families that their women, if they get the chance, can grow into irradiant, strong, non-stereotypical, spirited computer professionals. There is a crying need for non-stereotypical women in the ICT industry (Abagi et al., 2009). The full impact will only be measurable when the graduates peak in their careers many years ahead from now, and their perceived well-being and effect on local community can be fully felt. We can only assess the relation to their community back home, and their potential to succeed in their career and life. The symbolic value effects will discharge throughout the social system after graduation. Younger girls from their local community will have a concrete remainder that they should have high expectations for themselves, that they can go into workforce, highly educated. The classes are also adding to the symbolic value, proving that the woman in question is not a single exception, but a regularly occurring phenomenon. Even if the graduate will not succeed on the labor market, even the bachelor degree itself will have effect (Renn, 2014, p. 123). Furthermore, the CS-ICT program intervention affect areas in the periphery, where gender inequity in South Asia often persist. It had in many cases not been acceptable to offer a girl from such areas a scholarship to a co-educational institution. Our work here at least showed the potential and some success of women only CS-ICT program in a developing country's setting, which can be used as a benchmark for further development in STEM and related technical education for women. A logical step for further research is a tracer study in a few years, in order to analyze the life paths of the alumni and their networks, when reactionary elements of marriage, childbirths and other institutions have exerted their full pressure on the graduates.

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