The Leaky Pipeline: A Social Scientist's Perspective

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When we look at the representation of women in STEM disciplines, India has a very different picture when compared to the west. Our leaky pipeline does not arise because of low enrolment of students in STEM disciplines at the undergraduate or even postgraduate level. Over the decades, representation has been growing across the science streams at the undergraduate level, leading to nearly equal gender ratios in many streams. The data indicates that at the postgraduate level in 2018, there is over 50% representation of women, while nearly 35% of those doing doctoral research are women.

Therefore, it is clear that the main issue is not the participation of women in science streams at the higher education level. Our issue is that after PhD, where are these women going? And I think that is the fundamental question we should be asking. While we are vigilant that the supply end is steady and growing and that the enrolment rates doesn't drop, we need to shift our attention and concentrate on what happens at the other end, when these women graduate.

Here, our understanding is hindered by the fact that we do not have data in the public domain regarding the number of people who complete their doctorate. This data will be extremely useful if made available by gender and discipline, to understand the trends and shifting patterns over the years. Currently, since uploading the thesis on Shodhganga is mandatory, making this data available is relatively easy. Preliminary analysis of the data can be done at the national level and made available in the public domain. Similar databases from the US and European countries are a case in point.

On the formation of workspaces

The institutions for higher education in our country can very broadly be classified into four kinds – 1) Universities, 2) Institutes of national importance, 3) Research labs, and 4) Mission mode institutes, like ISRO, DRDO etc. Amongst these four kinds of institutions, the quantum of research that is visible has, for the large part, been produced by Institutes of national importance. And it is in these institutions that we have the least number of women. So, it is very important to understand the sociology of how workspaces get constructed.

Wherever a position carries higher status and greater economic returns, it has predominantly been men who have filled these positions. This is because they have had a historical advantage and have gained entry well before women. For women, at that time, there wasn't an adequate supply chain, and as a result their entry was delayed. So, once men occupied these positions and stayed there for decades, the rules of the game of these workspaces became tailored to be suitable for men – men who had the privilege of having women as homemakers. Once these rules were established, over decades they got entrenched and when women started entering these spaces, they faced resistance at the level of the entry itself. Some women have forged their way in nevertheless, but the numbers are very, very small, and the resistance persists across all levels: not just during entry, but also at the time of career progression.

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Need for evidence-based research

What would be very useful to understand the career trajectories of these women is a systematic longitudinal study, for which Institutes should record and allow access to their data. The moment you put the data together, it becomes stark clear that there is problem. For example, we can look at an institution like the Indian Institute of Science, and ask what was the percentage of women entering the institute when it was first established. After this, if we look at the progression over decades, and if we find that it has not changed substantially, we can state confidently that there is a problem, since the reason for the skewed ratio cannot be that the supply chain of

women has not increased for the last hundred years.

This has been one of the larger questions, and I think somewhere we have lost sight of the real problem. Until now, the underrepresentation of women has been captured partially by using frameworks that put the onus of the problem on the women. We are told that women make a personal choice of leaving science research, or that there are societal and family factors responsible for their underrepresentation. While I will not discount that these are important factors, I do not believe that these are the only reasons why more women are not out there occupying higher positions. And this is borne out by the study that I did with the Indian Academy of Sciences, where we asked women why they are no longer doing research. Over 60% of the responding women said that the main reason is that they did not get an opportunity. Based on intuition, perception and the limited framework that we were willing to see, it was always stated, "Women are not there in research because they do not want to be there". It was large-scale data that helped us counter this viewpoint.

Most comments made about the status of women in science at meetings and conferences are put forward on the basis of anecdotal personal information and this may not reflect the larger truth in many cases. I have done a survey of over 681 women across the country, and I think evidence-based research becomes extremely important to understand the problem in its totality.

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Changing workspaces, changing stories

It is important to understand that the social or societal context of these frameworks, as well as the organizational spaces, are constantly interacting and changing. Negotiations are taking place at all of these institutions and resistance is being challenged. Hence, changes are bound to happen and consequently the number of women will increase. In the pursuit of increasing the number of women in these institutions, it is important to document and highlight the positive experiences of women scientists who are part of these establishments. This will provide the needed impetus for women considering

their entry into science and technology institutions. Documenting and analyzing the data of these successful women who are invisible is critical. We need to speak to these women and men who are championed these changes to make them possible. We need to capture these success stories in order to say that there is evidence of people being able to make it up there.

As a researcher who has been studying this issue over a decade, I see that the ways in which biases operate, both conscious and unconscious, keep changing. And it is important to recognize these changing forms and to address them. This means that we will have to be constantly in touch with women entering and progressing in these scientific workspaces, because the challenges they face today will not be the same challenges that they face a decade later. To capture this dynamic process is a very important part of understanding women in science. If we don't recognize the ways in which the trends operate, we will end up addressing questions that no longer exist or are irrelevant.

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Not just a scientist's problem

It is very important, both at the national level and at the policy level, for the government to recognize that the problem of women in science cannot be studied by scientists alone. They do not have the training and they do not have the necessary perspectives that can help them recognize and understand the complex sociology of academic workspaces. While all of them are good at doing their science, I think it takes a different disciplinary approach to understand groups of women or to understand organizations and institutions. This is a social phenomenon which has a political and an economic context and unless we take a multidisciplinary approach to understanding the issue, we will not understand it in its entirety.

This calls for a different form of expertise and therefore including social scientists into understanding this problem is extremely critical. Scientists and social scientists need to conceive the problem together and set clear research objectives in order to make sure that the concerns of women in STEM are taken into consideration, but are set into a context that will allow us to understand how these organizations and

groups operate.

More importantly, I think it is important to include men in these discussions. You need perspectives from both science and social science to understand how have they navigated these spaces. It is important to locate your allies in different spaces and make them part of this larger journey of trying to redefine gender equality in workspaces, so that they're able to harness capacities of both men and women, who bring in their own strengths into furthering the cause of science and contributing to the national development. We also need to realize that gender identity is not defined by sex alone.

Right now, as a part of a study that we are running at NIAS, we are generating a lot of qualitative data, but it is not sufficient. One institution alone cannot study this diverse country. We should be launching national studies to collect data from across the country, and use this data to put forth a national report of women in science.

On policies and interventions

I think India is fairly good at putting a policy in place. But when we are looking at interventions, policy direction should have an institutional focus which requires a strong and able leadership to put changes in place. For every intervention that we make to promote and retain women in science, we will have outcomes

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that are positive and negative. We cannot allow the negative incidences to withdraw resources that could give women a way to move forward. Science institutions do not operate in isolation, they are part of a larger society. So, one of the things that have come up in discussions is whether we can have gender neutral interventions that will allow both men and women to redefine or reallocate their resources and responsibilities both at the workplace and at the home front.

At the same time, any policy that is put out needs to be reviewed and evidence needs to be gathered in terms of how it is getting used. This is very important and cannot be decided on the basis of just a few people's experience. We should be taking into consideration the experience of a large number of women scientists and carefully

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assess how many have benefitted from a policy versus the probability of misuse of the same.

I strongly contend that while coming up with interventions, representation should be redefined to have women at leadership positions right from the board level to directorships and deanships. This is just as important as increasing representation from the bottom-up approach. This is something we cannot approach sequentially; we have to increase representation at all levels simultaneously, since this is what will change the climate of the organization.

There has been very little study on women in leadership. I know a large number of women leaders, and they have very distinct trajectories. For my next project, I want to understand these trajectories and find out if there are lessons here for others to imbibe. We don't have to follow them exactly. I think women are so innovative, that they often create our own systems to work through and strike a work-life balance. But if we have knowledge about a wide variety of women who use very different strategies to progress, that is an information base that one can use to develop their very own approach to leadership.

At some level, I think we are very sub-critical when it comes looking systematically at questions of women in STEM. We have isolated researchers in different institutions looking at this sort of data. Instead, we should push towards larger-scale initiatives to generate data, and theorize it in the Indian context.