Being a woman in the world of physics education: female physics student teachers’ beliefs about gender issues, in the city of Valparaiso, Chile, from a qualitative perspective.

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Abstract

Gender Equality is undoubtedly one of the crucial discussions we are having as a society, since the past century. Science Educators can’t stay aside due to the relationship between STEM and women: In OECD countries, only 30% of degrees in the aforementioned area go to women. Education plays a fundamental role in changing the deeply ingrained social conceptions and unresolved issues regards Gender Equality and, in a broader perspective, Human Rights. Therefore, teachers must be aware of their role and beliefs on the matter. The present manuscript address in an exploratory, qualitative level, the views of a group of Chilean female physics student teachers regards their own educational experience and projections as science educators, unraveling their understandings, doubts, hopes and concerns. We performed in deep interviews, analyzed their discourse, and provided a group of ten categories of findings. The main domains of study were: parity, stereotyping, gender equality definition, and gender equality perspective in education; meanwhile the emergent categories were: naïve view of gender issues, self-sabotage, sexist behavior, parity, working environment, self-learning processes, informed view of gender issues, access, future-students’ learning processes, and expectations, of which the last was the most frequently addressed by our subjects. Each category is fully explained and supported by examples. Our findings are coherent with the current literature. We were able to define a clear profile of this particular group of our society: female students that are aware of gender issues in education, although with a lack of theoretical framework. Finally, it was interesting to find evidence about how females perceive gender issues regard their male classmates as well. The relationship between their experiences and the prolongation of gender issues is discussed.

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1. Introduction

Over the past century, the struggle for Women’s Rights has taken a growingly relevant place in international public policies. This struggle has had many different forms throughout the whole world, one of them being the development of different treaties and agreements between nations, such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) or the UN Security Council Resolution 1325 on Women, Peace and Security, all with the main goal being the progress towards gender equality in order to ensure that Human Rights are indeed being guaranteed for everyone, regardless of gender. There are also purely economic reasons for these treaties, since allowing half of the population the access to working environments from which they used to be banished increases the potential for development. This means that the countries that have agreed to abide by those treaties have decided to undertake the responsibility of implementing a wide variety of measures aimed at fighting the pre-established hierarchy between genders. Chile is one of these countries, and it’s clear there have been substantial improvements in certain aspects of gender equality on a national level; for instance, the democratic election of Michelle Bachelet as the first female president in Chilean history is a manifestation of these improvements. Despite this, there are still many unresolved issues that need to be addressed; in regards to this research, the opportunity for women to be seen as equally capable of succeeding and to be deemed a crucial element in the development of STEM areas (be it scientific research, science education, working practice, etc.) are two examples of those remaining incomplete tasks.

On the other hand, it’s been widely acknowledged that education plays a fundamental role in changing these deeply ingrained social conceptions, where teachers of all areas have the power to contribute to either perpetuate certain preconceived ideas about gender, or to fight them within their classrooms. For the latter to take place instead of the first, it’s required that educators understand the importance of this challenge, and realise they have the responsibility to impart conscious classes knowing they are more than just instructors, but also role models. Female participation in physics research and education is still regarded as both rare and somehow inappropriate, which has historically contributed to reinforce the belief that physics is mainly a male subject, therefore feeding the idea of certain areas being exclusive for one gender or the other.

Taking this into account, and for the previously mentioned treaties to be fulfilled in Chile, we believe that educators in all areas must recognise these issues and the extent of their power to become agents of change in their communities. Thus arises our research question: What are the beliefs that female physics student teachers have about gender issues in physics education, in the city of Valparaiso?

This research is based on the idea of gender equality, which is one of the main objectives of the United Nations Universal Declaration of Human Rights, and is achieved when girls, boys, women and men effectively enjoy the same rights, opportunities and responsibilities in society, including but not limited to economic participation and decision-making, regardless their condition (UN Women). The importance of gender equality lies on the very idea of Human Rights, but emphasizes on gender issues because of the historical differences in opportunities and rights between genders, which have been systematically detrimental to women. These differences have manifested themselves in the form of a series of stereotypes that have shaped the way societies understand the roles of men and women. Parents, both father and mother, expect very different lives from their children, depending on whether it is a boy or a girl (Jimenez 2006).

1.1. Objectives

The main objective of our study is to unravel the significances that female physics student teachers give to their experience through their undergraduate studies, from a gender equality perspective.

Specific objectives:
• Learn about their everyday experiences regards gender equality,
• Unveil their feelings about possible gender inequality,
• Expose the value that they assign to gender equality, and
• Find out their projections as future teachers relative to gender equality, within the aforementioned context.

2. Methodological framework

The epistemological option of developing a qualitative research in order to address the presented problem, challenges us to give significance to the beliefs that student physics teachers express regards this topic. Through in-depth interviews, we have the duty to unravel, subtly and respectfully: memories, experiences, fears and hopes of being a woman in the world of physics education.

According to Taylor & Bogdan (1995), the structured interview can be understood as an encounter aimed at understanding subjects’ perspectives about their lives, experiences and situations as expressed in their own words. Through the dynamic process, they will manifest their beliefs, but naturally our own perception will cause a distance between the real object of investigation, and our own rendering: constructions that we will make from our own frameworks. In order to diminish this gap, both authors will individually listen to the interviews in order to double check the collected information.

All of participants in this study are student teachers from a small college situated in the city of Valparaiso. Six female student physics teachers’ interviews have been processed, during November and December of 2014. For the interviews, we used an emergent design, which is understood as the in situ modification of the interview according to the conversation’s natural development.

The mean age of the subjects, whose interviews are analyzed in this manuscript, is 25 years old.

During the course of the interviews, we tried to act reflective and attentive to intervene when necessary to encourage our subjects in order to elaborate on an aspect identified as relevant.

3. The interview process and main findings.

Our first step was to establish certain domains to enclose emerging findings or categories for further analysis. The chosen domains were: parity, stereotyping, gender equality definition, and gender equality perspective in education. These domains served as guides in order to make proper questions and direct the interview process.

As comes naturally, the panorama changed through the interviews, for the original domains became much enriched in details than expected. The categories that emerged through the interviews are as follow:

Parity. Includes opinions about the number of student teachers and professors regards their sex, in their undergraduate program. Findings: In general, our participants perceive that the number of female and male students is balanced, but with fewer females than similar biology and chemistry teaching programs. Also, it was perceived that the female science professors were extremely few: we have had only two (Participants 1 and 2) In fact, Participant 4 says: If you count the offices that have male names and the ones that have female names, it’s becomes clear… that physics is a men’s world.

Stereotyping. Understanding it as conforming to a set image or type, we felt the need to divide it in two subcategories: access and self-sabotage. The first one, access, includes the experiences about how adults negatively affect young people’s choosing of career, from a gender perspective. For example, Participant 3 said: they (school teachers) should present more options, not only the most popular. In science and technology, they should promote those with a promising working field; I would explain to them (students) what’s behind a career, different curricula and universities when asked about what would increase the number of female student into STEM careers. In general, our participants are aware of the little knowledge, hence limited options (Participant 1) at the moment of choosing a career. Participant 4 categorically said, on this matter: I feel on a mission to show to other women that they can. (…) we are not destined to be nurses.

On the other hand, self-sabotage includes findings each time our participants told us stories about how mostly female classmates self convinced about their limitations and inabilities towards mathematics, affecting negatively their studies and career pursue. We directly asked our participants if they believed there was a cognitive difference
between males and females, conditioning their academics results. All of them had an informed vision and recognized it was not about capacities, but attitudes: what we call in this manuscript as self-sabotage, because our participants saw how bad self-conditioning turned into academic failure. For example, Participant 3 said it is not cognitive. Is daily biased. It comes from childhood, that they make you fear math and sciences, unless you have parents that teach you perseverance instead. As has been related by experts (IOP 2012), parents have a duty towards gender equality.

One of our participants perceives that some male students pursue certain careers instead of pedagogy due a self-imposed role of provider, which implies that they follow certain paths in order to earn more money.

Gender Issues presented two emergent dimensions: informed and naïve visions of this concept. Happily, the second category had few frequencies, being our participants informed about gender issues and the equality movement. Participant 2, for example, insisted that students don't have differences in capacities, but in preferences, which is theoretically related to the concept of gender.

Gender Equality Perspective in Education allows us to elaborate into the specific frame of physics education.

This last domain gave us several emergent elements:

Expectations, includes findings about the differences in expectations that family, professors and classmates make towards others, because of their sex. This is the category that gave the highest number of evidence. Specifically, every participant has suffered marriage and motherhood expectations over their professional development, from adults outside college. Now, considering only the findings related to their professors, it was frequent to hear things as they (male professors) expect less from female students in math (…) for them it is normal that a female student struggle with a physics course, but from a male student that's not expected. (…) Female professors also have different expectative from male and female students. (Participant 3) Participant 4 states: Women who got here did so because they already defeated all these stupid cultural barriers, meaning that they don’t need to further prove themselves.

Perhaps the hardest thing to hear was that women must earn their respect (Participant 2), referring to female intellectual status among their peers, while a lower performance from male students its accepted (Participant 3) Those are examples of how much unnecessary stress is put upon female student teachers, just because of their sex, while male students are simultaneously exempted from demonstrating their intellectual value, and thought as low achievers. These findings are coherent to literature.

Self-Learning processes considers findings about their own experience through the learning process of their career; all participants agreed there are important differences in the way female and male undergo their studies, both in lab and theory. Grades are similar, said Participant 2, but the difference is attitudinal. Females devote more.

Future-students-Learning processes is oriented to the pedagogical content knowledge or PCK, and involves their beliefs about what may happen to their future students. Our participants had strong and informed opinions about making physics accessible to all their future students, having in mind their sexes. But, there is a lack of evidence about social gender construction knowledge and the influence our subjects will have over their future students. Our participants had strong and informed opinions about what work their beliefs about what may happen to their future students. Our participants had strong and informed opinions about making physics accessible to all their future students, having in mind their sexes. But, there is a lack of evidence about social gender construction knowledge and the influence our subjects will have over their future students. All of them had an informed vision and recognized it was not about capacities, but attitudes: what we call in this manuscript as self-sabotage, because our participants saw how bad self-conditioning turned into academic failure. For example, Participant 3 said it is not cognitive. Is daily biased. It comes from childhood, that they make you fear math and sciences, unless you have parents that teach you perseverance instead. As has been related by experts (IOP 2012), parents have a duty towards gender equality.

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No relations were made between their experiences as learner, with projections to their future students.

Working environment, also considered as part of Gender Equality Perspective in Education, is an emergent category that involves opinions about working conditions in relation to negative attitudes towards female teachers. Half of our participants are already working under supervision in the educational system. School male-teachers consider that a female-teacher in an administrative position is going to be light, because she is a woman (Participant 3) Also, it was a general opinion that schools demands certain clothing etiquette to female teachers, while not asking anything from men. This is certainly worrisome evidence, since correct etiquette must be equally expected from everyone attending an academic environment. This is a classic example of discrimination.

Sexist behavior. We felt the need to consider a last emergent category, that could count for findings involving what our participants believed and felt as conflicts towards their dignity, due to their sex. Participant 3 said: I was told that because I’m a woman, male students would engage better with my classes. Since I’m pretty, I should work
in an upper class all male school, because I don't qualify for a municipal school. She was impressed by the sexism behind this recommendation from a male professor. From a theoretical point of view, this evidence corresponds to what is called benevolent sexism, which basically isn’t hostile (Glick & Fiske, 2001) Another example of such a behavior is the one related by Participant 4: I would never forget that one time that I had the final grade of a course. I had a 5.6 out of 7.0 and I was one of the best grades, and the guy came and said: you?! A 5.6?! Like that! Almost because I am a gal.

The following table shows the ranked categories according to the frequency of our findings.

Table 1. Findings from the Interviews of 6 female student teachers of physics education.

<table>
<thead>
<tr>
<th>Category</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naïve view of gender issues</td>
<td>7</td>
</tr>
<tr>
<td>Sexist behavior</td>
<td>13</td>
</tr>
<tr>
<td>Parity</td>
<td>14</td>
</tr>
<tr>
<td>Working environment</td>
<td>16</td>
</tr>
<tr>
<td>Self-Learning processes</td>
<td>17</td>
</tr>
<tr>
<td>Informed view of gender issues</td>
<td>19</td>
</tr>
<tr>
<td>Access</td>
<td>20</td>
</tr>
<tr>
<td>Future-students-Learning processes</td>
<td>22</td>
</tr>
<tr>
<td>Expectations</td>
<td>37</td>
</tr>
</tbody>
</table>

4. Final comments and discussion

It was possible to unravel the significances that female physics student teachers give to their experience through their undergraduate studies, from a gender equality perspective, at a starting point. In fact, already a clear profile is emerging: students are aware of gender equality perspective in education, although their theoretical framework is practically absent, telling us the importance of sharing with them more about this topic and opening a dialogue between all members of the educational community, just as the literature emphasizes.

We finish this results analysis with a positive impression: Female student teachers are well aware of the challenges of the field. They understand what sexist behavior is; they succeed differentiating what is hostile and benevolent, recognizing in each form a very negative behavior. They also agree it has been isolated cases.

One interesting finding is how both male and female professors have different expectation among their students because of their sex. It is very interesting the tension that male student suffer, and the pressure put upon female students. It is arguable this is the way a vicious circle is fed regards gender inequality. As was stated in the introduction, educators have the most important place in order to achieve equality.

For future interviews, we will help our participants elaborate more about their feelings about gender issues, which is the objectives of investigation less achieved. Nevertheless, our work is well aimed, since we were able to identify many layers about gender equality from the discussion of their experiences and personal perceptions. Undoubtedly, this work will provide several recommendations to the educational community, based on evidence.

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References


