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THE TEACHING COMMUNITY OF THE EASTERN REGIONAL UNIVERSITY CENTER, URUGUAY. AN ANALYSIS WITH A GENDER PERSPECTIVE

LA COMUNIDAD DOCENTE DEL CENTRO UNIVERSITARIO REGIONAL DEL ESTE, URUGUAY. UN ANÁLISIS CON PERSPECTIVA DE GÉNERO

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ABSTRACT

This work seeks to characterize the generalities of the scientific community in the Eastern Regional University Center (CURE) of the University of the Republic (Udelar) in Uruguay, and especially, the participation of women in this field. Additionally, the gender relations present in the CURE will be compared with the average of the Udelar. Academic and scientific women, although they have a high rate of participation in the generation of knowledge, do not have equal access to positions of power and prestige as their male peers. The statistical technique of cluster analysis, PAM and hierarchical clusters, was applied to a sample of 167 teachers. Clustering has proven to be a useful tool, with both techniques, showing the presence of 2 well-differentiated groups in the CURE teaching community, where it can be seen that the differences between them are consistent with the gender inequalities present in the scientific community. of the country, particularly in the Udelar. As a main conclusion, we can affirm that in the CURE vertical segregation is deepened, the accumulation of women in positions and lower levels of stratification of the scientific systems, and in their consequent underrepresentation in the highest-ranking positions. This work invites reflection on the change in thinking regarding the representation of women, in society in general and in the scientific community in particular, as an absolutely necessary imperative.

Palabras clave:
clústers, brechas de género, poder, docentes universitarios.

RESUMEN

Este trabajo busca caracterizar las generalidades de la comunidad científica en el Centro Universitario Regional del Este (CURE) de la Universidad de la República (Udelar) en Uruguay, y especialmente, la participación de la mujer en este ámbito. Adicionalmente, se compararán las relaciones de género presentes en el CURE con la media de la Udelar. Las académicas y científicas, si bien tienen una alta tasa de participación en la generación de conocimiento, no

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poseen igualdad de acceso a las posiciones de poder y prestigio que sus pares varones. Se aplicó la técnica estadística de análisis de clústers, PAM y clústers jerárquicos, a una muestra de 167 docentes. El clustering ha mostrado ser una herramienta útil, con ambas técnicas, que muestra la presencia de 2 grupos bien diferenciados en la comunidad docente del CURE, donde se pueden ver que las diferencias entre ellos son consistentes con las desigualdades de género presentes en la comunidad científica del país, en particular en la Udelar. Como principal conclusión podemos afirmar que en el CURE se profundiza la segregación vertical, la acumulación de las mujeres en cargos y niveles más bajos de estratificación de los sistemas científicos, y en su consecuente subrepresentación en los puestos de mayor jerarquía. Este trabajo invita a la reflexión acerca del cambio de paradigma respecto a la representación de las mujeres, en la sociedad en general y en la comunidad científica en particular, como imperativo absolutamente necesario.

Introduction

The integral development of research in the country, basic, fundamental, applied and technological, and in all cognitive areas, is an inalienable principle (Bianchi & Snoeck, 2009). Caring for the diversity of knowledge points to the preservation of culture, contributes to the creation of productive opportunities with high added value, and highlights the importance of the existence of independent scientific and technological thinking, as this strengthens the sovereignty of any nation. It is particularly relevant in countries such as Uruguay, where transferring knowledge from academia to the productive, economic and social fabric is a key factor in promoting development. The participation of women and men in the world in this field is not equal. A clear difference is inferiority, given both by the lower numbers and the various barriers that have hindered women's access to science and perpetuated their inferior epistemic status (González-García & Pérez-Sedeño, 2002).

Currently in Uruguay, the overall participation in research is equal, however, women have a significant minority participation in decision-making areas (Bentancor et al., 2020). In the National System of Researchers, 77% of Level III researchers are men and in the University of the Republic (Udelar) 69% of Grade 5 researchers are men.

According to statistics presented by UNESCO (2021) currently less than 30% of the world's researchers in STEM (science, technology, engineering and mathematics) are women; in Latin America this figure is higher, reaching 45%. Numerous studies have found that women in STEM fields publish less, are paid less for their research, and do not progress as far as men in their careers (UNESCO, 2016). However, there is very little data at the international or even national level to show the extent of these disparities.

If we analyze the figures for Udelar, the institution that carries out the largest amount of research and in which at least 70% of the academics with doctoral degrees in Uruguay are working (Burone & Méndez-Errico, 2022), the teaching community is no stranger to the distribution by area of knowledge presented in international reports referring to other scientific communities (UNESCO, 2012). Statistics show that the greatest number of women are at the bottom of the pyramid, grades 1 and 2, but as the teaching career progresses, this is reversed at higher grades.

Table 1

Distribution of teaching staff by grade and gender at Udelar

Genre	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Female	58,4%	58,6%	51,9%	45,7%	34,2%
Male	41,6%	41,4%	48,1%	54,3%	65,8%
Posts	3461	4065	2679	796	624

Note. Integrated Personnel Administration System - SIAP (April, 2021).

The same logic is repeated for full-time teachers. For the researchers, seeing that their peers are promoted and they are in the same place shows gender inequalities in job positions that are not right. Injustice generates unhappiness and dissatisfaction, and unhappiness is reflected in the job satisfaction of our female researchers (Burone & Méndez-Errico, 2022). The ability of academic institutions to judge them and treat them fairly is closely linked to the motivation of women who want to invest in science and move up the career ladder (Miranda, 2021).

Table 2
Distribution of Total Dedicated Teachers at Udelar

Genre	Grade 2	Grade 3	Grade 4	Grade 5	Total
Female	56%	56%	44%	31%	49%
Male	44%	44%	56%	69%	51%
Total	233	475	257	212	1177

Note. Integrated Personnel Administration System - SIAP (April, 2021)

This trend is repeated in the distribution of research professors who are members of the National System of Researchers (SNI). As one moves up the hierarchical structure of research levels, female participation decreases. Women represent 50.8% at the lowest levels of the system (Initial and Level 1) and only 30.2% at the highest levels (Levels II and III). In addition to this, women have a lower probability of being accepted into the SNI, the difference in terms of the probability of entering is 7.1 percentage points (Bukstein & Gandelman, 2016).

The culture of power and gender bias in organizations.

Gender is a category of analysis that must be taken into account when explaining organizational processes and the functioning of organizations in general. The paradigm that women and men have competencies and characteristics indivisibly associated with gender, and by virtue of these, they should be linked to an appropriate role in different organizations has lost its validity. Organizations are not neutral, so it is necessary to take into account the influence of gender in their structure, functioning and relations (Acker, 2000).

Today, where women and men legally have the same rights and obligations, discrimination is produced by hidden practices, interactions and discourses that go unnoticed (Carrasco Macías, 2004). It is therefore necessary to study and analyze the unequal participation of women and men in scientific activity from a gender perspective that problematizes power relations in all social spheres, including science as a social institution with its own particular normative arrangements (Bianco & Sutz, 2014, p. 149).

In reference to the classic concept of power as a synonym of domination we can cite Max Weber's definition (1993) which states that "power is the probability of imposing one's own will, within a social relationship, even against all resistance and whatever the basis of that probability may be" (p. 43). While Weber argues that power always refers to the intentionality and will of the individual, for the philosopher Hannah Arendt, power is the human capacity to act in concert and is therefore inherent to every community, "it arises whenever people come together and act in concert" (Arendt, 2006, p. 48).

Arendt (2006) arendt points out that the survival of power is closely linked to the degree of adhesion it manages to arouse and maintain in the members of the community, as she explains in her work On Violence:

> Power is never the property of an individual; it belongs to a group and continues to exist as long as the group remains united. When we say that someone is 'in power', we really mean that they have a power of attorney from a certain number of people to act on their behalf. The moment the group, from which the power has originated (*potestas in populo*, without a people or group there is no power), disappears, 'its power' also disappears. (p. 60)

If we analyze the scientific community through this lens, we can recognize the existence of a dominant masculine culture and an acceptance of it, shared or at least consented to, by the majority of its members. Domination relations are not based on conscious decisions, but are hidden to both the dominant and the dominated, and are expressed in long-lasting, spontaneous perceptions and habits (Bourdieu, 2000). Power is tacitly or explicitly based on the number of people who grant their support and obedience to this way of operating "and the question of that obedience is not decided according to the relation of command and obedience, but by the opinion and, indeed, by the number of those who share such an opinion." (Arendt, 2006, p. 67).

Regarding the relationship between power and gender according to Scott (2013) "Gender is a primary form of signifying power relations. (...). It is the primary field within or through which power is articulated." (p. 292). When we refer to gender, we are proposing a relational study, in that it is not exclusive to women but to the relations between women and men, and to social relations based on gender as a whole. Society determines and expects different things for the masculine and the feminine, as a result of the historical and social context in which it is framed, and in turn as a construction that is manifested in the social relationship and in the construction of the models themselves (Gómez Quinelli, 2012).

Gender participation and equality is not only about doing science, but also about managing institutions and integrating the spaces where science policies are defined. Decision-making positions related to the allocation of resources and the implementation of scientific policies are privileged areas for promoting strategies that contribute to the creation of equal opportunities. Stimulating more equitable collective associations, open to the participation of women in decision making will result in better organizations, with more tools to participate in the elaboration and definition of scientific policies of better quality for the country and impact for the whole society, "power can be divided without diminishing it, and the reciprocal action of powers with its counterweight and balance is even prone to generate more power, at least while such reciprocal action is still alive and does not end up stagnating" (Arendt, 2009, p. 213).

Therefore, it is necessary to incorporate the gender perspective in the understanding of processes such as teaching and research career evaluation, management and leadership, for which we must analyze social relations, organizational reality and the existence of biases in an environment dominated by male leaders. Both scientists and academics recognize objectivity and impartiality as their own values, yet paradoxically, they are more likely to engage in this type of gender bias, even without deliberately making discriminatory decisions (García Dauder & Pérez Sedeño, 2018). Transformation must go beyond the individual level of empowering women; it is about the historical context in which we live, the organizations, their culture and power relations.

Women in the field of science: we are all products of ideas.

History tells the story of great scientific achievements always starring men, with exceptions such as Marie Curie, Rosalind Franklin or Paulina Luisi in Uruguay, the lack of knowledge by the general population of the participation of women over time in the creation of knowledge is real. Today it is known that numerous women scientists who made significant contributions to the development of science had the authorship of their achievements taken away from them, their male relatives, husbands or colleagues taking credit for their discoveries and, of course, the recognition of the community and even noble prizes[2]. It was sociocultural factors, discrimination and machismo that led women

[2] Only 3% of the Nobel Prizes in science have been awarded to women since the prizes were established in 1901.

to remain in the shadows of science, and when they have been recognized, it has been belatedly or posthumously.

Women's participation in epistemic and social activities is as old as human culture (Jesús Santesmases, 2019). Many factors have hindered, and still do to some extent, the entry and development of scientific careers by women on equal terms with their male peers (CSE-Udelar, 2021). The reasons for low participation are complex and multi-causal, and vary according to the woman's stage of life, and may be individual, family, social and/or economic factors (Hernández Herrera, 2021; Guevara, 2021).

Studies and analyses from a gender perspective constitute a fertile field for identifying aspects of the scientific-technological community and the existing power relations (Acker, 2000; Borrell et al., 2015; Mandiola Catroneo, 2020; Ortiz Gómez, 1997; Osborn, 2008). A priori, it could be said that in institutions where knowledge, skills and competencies are imparted, which are made up of qualified people with greater cultural resources to question and analyze realities, there should be no segregation of any kind. However, horizontal and vertical segregation is present in them (Ramírez Saavedra, 2019).

To explain the exclusion of women in the upper levels of the scientific professions, most research focuses on individual factors, social influences or institutional practices (Miranda, 2021). In addition, there is a strong case to be made that the ability of academic institutions to judge and treat fairly women who want to do science and move up the scientific career ladder is a key motivating factor. A crucial aspect is the performance evaluation of women scientists, when they apply for competitive funds for research, scholarships, prizes or positions, there is a bias, often unconscious and rooted in organizations that leave them in the background (Vargas et al., 2020).

Along these lines, the results of research conducted at Yale University in 2012, popularly called "the John & Jennifer effect", (Moss-Racusin et al., 2012) concluded that, in general, science faculty at American universities consider female students to be less competent than male students with identical ability and preparation. On the other hand, Alice Wu, a young American economist at the University of Berkely in 2017, demonstrated in her graduate thesis using as evidence the institutional language of universities, the existence of gender stereotypes and the clear and forceful differentiation of males in the treatment towards women and men.

Society perceives that women do not have the necessary qualities to be successful scientists, which contributes to fuel discrimination and prejudice (Carli et al., 2016)this contributes to discrimination and prejudice, the result of gender stereotypes that are perpetuated from generation to generation, imperatives of a male-dominated culture. No one is free from the influence of the community to which he or she belongs, and from the ascendant position of science in today's world, to a greater or lesser extent each of us is both a beneficiary and a victim of scientific invention... (Hustvedt, 2016). Faced with this overwhelming reality, it is to be expected that even today, women's participation is a consequence of a hostile environment that perpetuates past practices and outdated conceptions. The lack of female role models in which the new generations can recognize and be inspired by is both a cause and a consequence of the same reality.

In the words of García Dauder and Pérez Sedeño (2018):

> The presence of women in science (as in other groups) is not a sufficient condition for better science, but it *is necessary*. Because (...) when science is done from the point of view of groups traditionally excluded from the scientific community, many fields of ignorance are identified, secrets are revealed, other

> priorities are made visible, new questions are formulated and hegemonic values are criticized, sometimes even causing real paradigm shifts. (p.11)

Research question

The research question that guided this work was: is it possible, based on demographic and academic characteristics, to compare the gender relations of the CURE teaching community with respect to the Udelar average? The objectives were to describe the main characteristics of the CURE teaching community and to compare the characteristics of the CURE teaching community, especially gender relations, with the Udelar average.

Method

Domain description

The dataset is composed of 167 teachers belonging to CURE-Udelar as of June 2022. Teacher data are related to sociodemographic and academic characteristics. These are: gender, age, number of children, position, area of knowledge, SNI level, membership in the full-time program and teaching grade. The information was obtained from Udelar's Personnel Administration System, from the public consultation of the National System of Researchers and from Udelar's Central Commission of Central Dedication.

The variables measured were as follows:

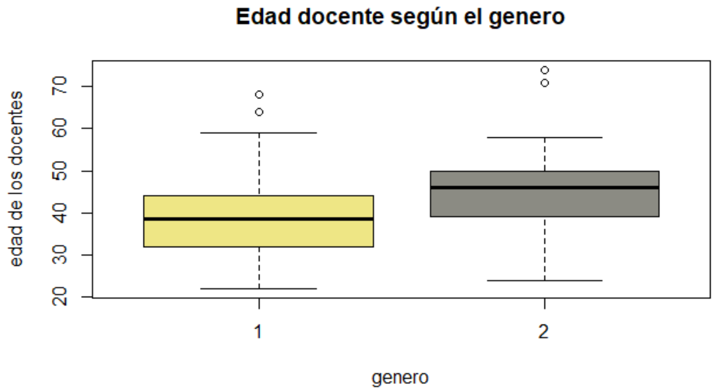
1. Gender: female or male.
2. Age
3. Number of children: grouped in 3 categories 0, 1 and 2 or more.
4. Teaching grade:
   - Grade 1
   - Grade 2
   - Grade 3
   - Grades 4 and 5
5. Cargo
   - Hired
   - Interim
   - Cash
6. Research area:
   - None
   - Natural and exact sciences
   - Humanities
   - Agricultural sciences
   - Social sciences
7. Degree in the National Research System:
   - Initiation
   - Level I
   - Level II
   - Level III
   - Not a member of the SNI

8. Total Dedication: dichotomous variable (yes, no)

The analysis was performed in R software[3]. R is an open source programming language and software environment for statistical computing and graphics creation. Different packages were used, which will be mentioned throughout the report, and which are extensions of R, allowing to perform certain functions that are not available by default in the system.

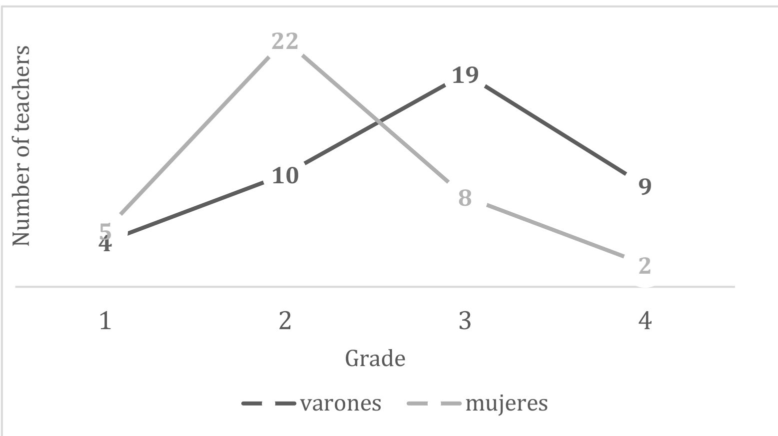
Regarding the description of the teaching community and as characteristics to be highlighted: 53% are women (88 cases), with an average age of 39 years for women and 46 years for men. Women are, on average, 7 years younger than their male counterparts.

Figure 1
Teaching age by gender (1-female, 2-male)



Fifty-eight percent of females (51 cases) and 47% (37 cases) of males are childless. In the case of teachers who are fathers and mothers (42 and 37 cases, respectively), it is noteworthy that the relationship is even at the level of grade 1, and at the level of grade 2, mothers represent more than twice as many as fathers. (22 mothers to 10 fathers) This difference is reversed at grade level 3 and deepens at higher grades.

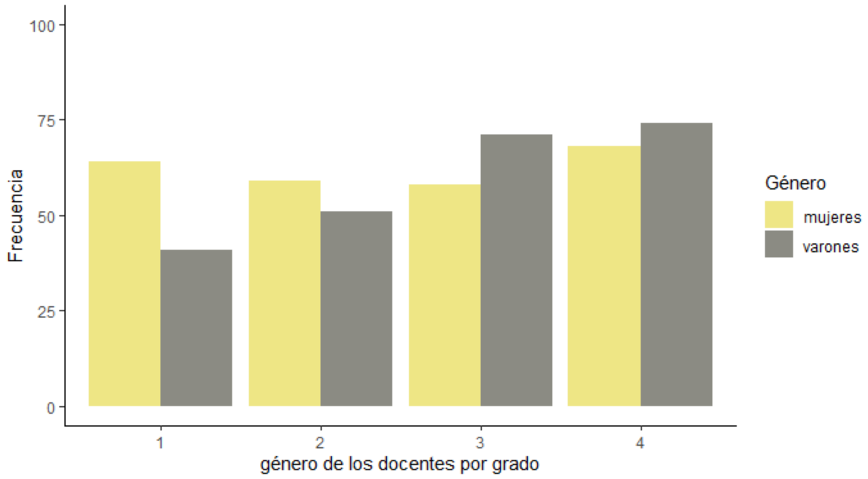
Figure 2
Number of mothers and fathers by grade



[3] https://www.r-project.org/

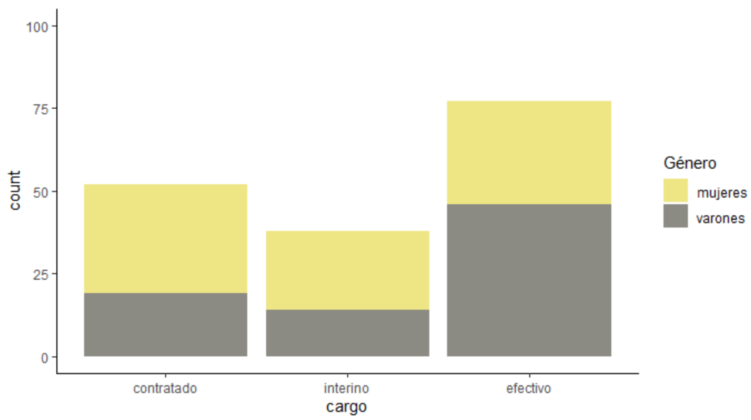
Regarding the gender distribution by grade in grades 1 and 2, the majority are women (68% and 63% respectively) and from grade 3 onwards, men are in the majority (65% in grades 3 and 82% in grades 4 and 5).

Figure 3
Gender distribution by grade



Thirty-one percent are contract teachers, 23% are interim teachers and 46% are permanent teachers. Sixty-three percent of contracted and interim teachers are women, while 60% of the effective teachers are men. The precariousness of women's working conditions compared to those of men is already evident here.

Figure 4
Number of women and men according to teaching position



Of the total set, 35% belong to the full-time regime (23 women and 35 men). As for the SNI (composed of 24 women and 38 men), 7% are in initiation, 25% level I, 4% level II, 1% level III (100% men), while the remaining 63% are not.

Unsupervised techniques

Cluster analysis (CA) consists of finding patterns or groups from a data set. The formation of such groups makes it possible to see what characteristics determine them, so that the elements of the group are as similar as possible to each other, while at the same time differing as much as possible from the observations of other groups. CA is an unsupervised learning method where only X values are available and there are no class labels identifying the observations. In contrast to classification problems, the (possible) structure of the groups is unknown a priori, including the number of classes or clusters (Bourel, 2021).

Partitioning Clustering: k-medoids

In this research we have a mixed data set with numerical and nominal (categorical, unordered) covariates, and therefore we will use the distance matrix obtained from the daisy function (dissimilarity matrix calculation) with Gower's coefficient. After calculating the dissimilarity matrix, cluster analysis techniques will be applied with the PAM (Partitioning arounds medoids) clustering algorithm and the silhouette coefficient to select the optimal number of clusters.

R tip: from the cluster package the daisy() function with metric = "gower" and pam() for k-medoids clustering.

Daisy and Gower coefficient: calculation of the dissimilarity matrix

The Daisy function is described in detail in Chapter 1 of Kaufman and Rousseeuw (1990). Gower's coefficient (1971) is highly recommended for multivariate databases, both quantitative and qualitative in nature. Features are first automatically standardized, re-scaled to fall into a range [0 1]. Distance is a numerical measure of how far apart individuals are, i.e., a metric used to measure the proximity or similarity between them. The Gower distance is calculated as the average of the partial differences between individuals, each partial dissimilarity (or Gower distance) ranges in [0 1].

$$d(i,j) = \frac{1}{p}\sum_{i=1}^{p} d_{ij}^{(f)}$$

1Gower's distance formula

The calculation of partial differences (dijf) depends on the type of variable being evaluated. This implies that a particular standardization will be applied to each feature, and the distance between two individuals is the average of all feature-specific distances. For a qualitative characteristic, the partial dissimilarity f is equal to 1 only if the observations yi and yj have a different value. Zero otherwise.

K-medoids clustering (PAM: partitioning arounds medoids)

K-medoids is a clustering method that groups observations into k clusters, where k is preset by the analyst. It is more resistant to noise and outliers compared to k-means (due to the properties of the distances used) and produces a typical individual for each group, called medoids, for which the average dissimilarity between him and all other group members is minimal. The medoid corresponds to the most central element of the cluster, and therefore can be considered as a representative example of the members of that group.

The most commonly used algorithm for applying K-medoids is known as PAM. To estimate the optimal number of clusters, k, we will use the silhouette coefficient method, a technique that measures the quality of a cluster. The optimal number of groups is the one that maximizes the average silhouette coefficient over a range of possible values for k (Kaufman & Rousseeuw, 1990) . On the other hand, the fact that it does not work with the mean, but with an element of the domain that approximates it, the medoid, is important because it allows its graphical identification if the cluster does not have too many elements (Cabalo & Caetano, 2001).

Internal validation metrics can be used to choose the best clustering algorithm as well as the number of clusters. To assess the consistency within the data sets, as discussed above, we will use the silhouette coefficient approach in order to rate the relevance of the chosen number of groups. This coefficient contrasts the average distance to items in the same cluster with the average distance to items in other clusters, i.e., how close you are to individuals in your cluster and how far from other clusters. Objects with a high silhouette value are considered well grouped, objects with a low value may be outliers. Keep in mind that the analyst's criterion is always necessary to evaluate the results of the technique and the relevance of the number of clusters according to the objective pursued.

Hierarchical clusters

Hierarchical clustering is an alternative to partitioning clustering methods. One of the disadvantages of MAP is that the number of groups k. must be specified in advance, whereas hierarchical clustering does not require us to commit to a certain choice of k (James et al., 2013). The results of hierarchical clustering are usually represented by a hierarchical tree diagram, known as a dendogram. Groups or observations that are more similar are combined at low altitudes, while those that are more dissimilar are combined at higher altitudes.

R tip: hclust()and cutree(), from the dendogram and with a given k returns the clusters.

For interpretation, if you choose any height along the y-axis of the dendrogram, and move through the tree counting the number of lines you cross, each line represents a group, identified when the objects are joined into segments. The observations of this group are represented by the branches of the dendrogram that expand below this line.

For the clustering process to be carried out, it is necessary to define how the similarity between two clusters is quantified. In this case, we will use the linkage average which calculates the distance between all possible pairs formed by an observation from cluster 1 and one from cluster 2. The average value of all of them is selected as the distance between the two clusters (mean intercluster dissimilarity). This method is chosen because the generated dendogram is more balanced.

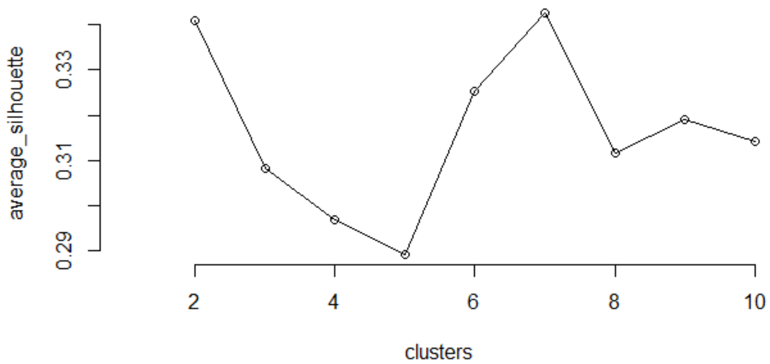
Some considerations exposed by James (2013) concerning clustering is that it can be a very useful tool in data analysis in an unsupervised setting, however, there are a number of problems that arise when performing clustering. In the case of hierarchical clustering, what dissimilarity measure should be used, what type of linkage should be used, where should we cut the dendogram to obtain clusters? With these methods, there is no single correct answer: any solution that exposes some interesting aspects of the data should be considered. In practice, we try several different options and look for the one that has the most useful or interpretable solution. Whenever clustering is performed on a dataset, we will find clusters. It is therefore necessary to analyze whether the groups that have been found represent true subgroups in the data, or whether they are simply the result of grouping by applying the algorithm. The question we should ask ourselves is if we were to obtain an independent set of observations, then would those observations also show the same set of clusters?

Results

K-medoids clustering (PAM: partitioning arounds medoids)

The silhouette coefficient showed that the 2 groups with the highest coefficient are 2 and 7. From the analysis carried out, despite having equal coefficients for k=2 and k=7, the partition into two groups will be chosen as it allows for easier interpretation of the characteristics of the groups. The partition into 7 groups presents mixtures in the characteristics of the covariates representing each group. We also sought to study how the gender variable plays in the groups formed, being dichotomous, it is consistent with the choice of 2 clusters

Figure 5
Silhouette coefficient

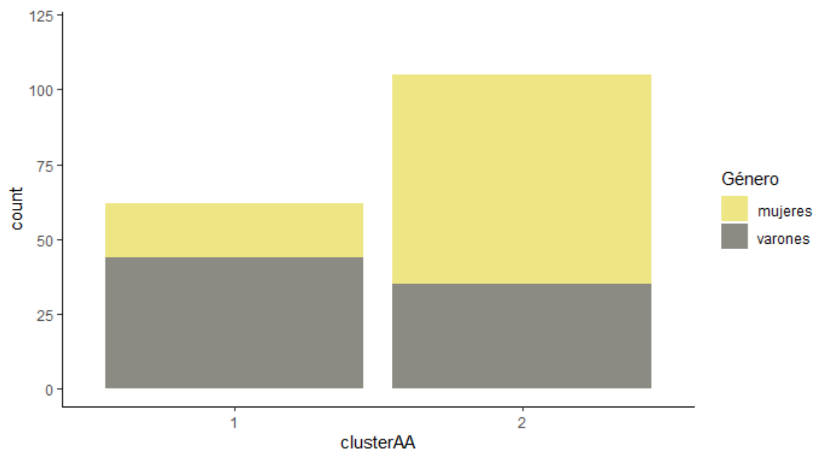


From the summary of each cluster, using the summary function in R we conclude that:

The first group (clusterAA 1) is made up of 62 individuals (37% of the cases), mostly full-time teachers (47 cases), 95% of the teachers belong to the SNI, 90% are grade 3 or higher, 82% have effective positions, their average age is 48 years, and 67% are male. The medoid of the group is teacher 87, his characteristics are grade 3, 49 years old, with 2 children, effective, belonging to the SNI level I), with total dedication, and male.

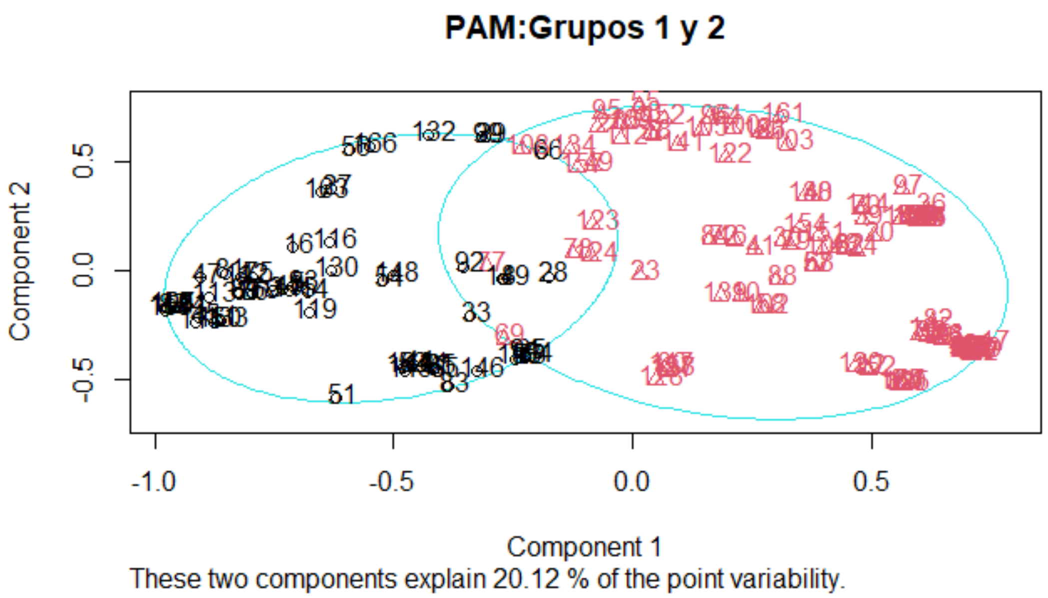
The second group (clusterAA 2) is made up of 105 teachers (63% of the cases), most of them are not full-time (94 cases), 88% do not belong to the SNI, they are all in grades 1 and 2, 75% are hired and interim positions, they have an average age of 38 years, and 65% are women. The medoid of the group is individual 90, grade 2, 35 years old, has no children, is hired, does not belong to the SNI or the full-time regime, and is a woman.

Figure 6
2 Clusters



The 2 groups generated by PAM are shown in Figure 7:

Figure 7
Graphical representation of the 2 clusters (PAM)



Hierarchical clusters

A second statistical technique of cluster analysis was used to analyze the formation of groups. From the average method, k=2 was identified in order to compare the results obtained with the previous technique (PAM). Once the dendogram is created, with the cutree() function we cut the tree to generate the 2 groups.

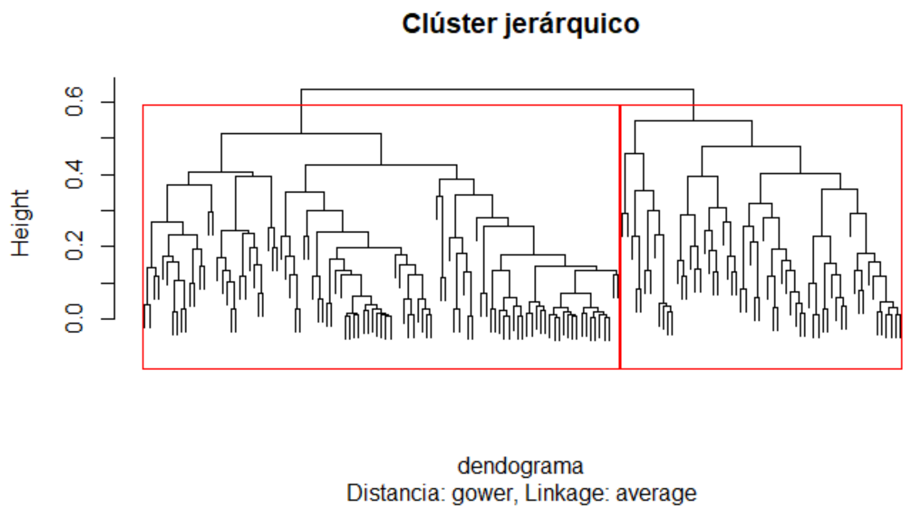
The hierarchical agglomerative clustering method with linkage average and k=2 was able to group the observations into 2 groups, of 62 and 105 teachers respectively. We will see below the characteristics of each one.

Group 1 (62 teachers) is made up mostly of men (71%), 97% of them have a grade 3 or higher, 62% hold effective positions, 76% are full-time teachers and 76% are members of the SNI.

Group 2 (105 teachers) is composed of 67% women, all of them are grade 1 and 2 (41 and 64 respectively), 75% are hired or interim positions, 90% are not in the full-time regime, and 86% are outside the SNI.

A priori we could say that these groups are consistent with those generated by k-medoids. Visually, the dendogram obtained is as follows, each rectangle representing a group.

Figure 8
Dendogram



Comparison of results with PAM and HCLUST

For the purpose of measuring the relative validity of the techniques, the table function can be used to compare the results of the hclust and PAM solutions for k=2, referring the rows for HCLUS and the columns for PAM and the matches between the two methods are totaled on the main diagonal. In this case, both methods classified 55 teachers in group 1 and 98 teachers in group 2.

Table 3
Comparison between hclust and PAM

HCLUST/PAM	Group 1	Group 2
Group 1	55	7
Group 2	7	98

They had a difference in classification of 7 teachers in group 1 (PAM classifies them in 1 and HCLUST in 2) and 7 teachers in group 2 (PAM classifies them in 2 and HCLUST in 1). Coincidence was very high at 91.6%.

Discussion and conclusions

Let us recall the question posed, is it possible, based on demographic and academic characteristics, to compare the gender relations of the CURE teaching community with respect to the Udelar average? We use unsupervised k-medoids clustering and hierarchical clustering techniques to answer this question.

The first question is whether the information obtained from the description of the CURE teaching staff can be used to draw conclusions that allow us to analyze gender relations in the academic structure. Firstly, in the Udelar teaching staff average, 55% are women and 45% men, (Universidad de la República, 2021)while in the CURE these figures are 53% and 47%, respectively, so we could say that the distribution by gender in quantity in CURE follows the trend of Udelar.

However, when analyzing the gender distribution by grade, we see that there are dissimilar situations. In levels 1 and 2 at CURE there are more women than the Udelar average, 68% and 64%, compared to 58% and 59% respectively. This situation is reversed from grade 3 onwards, with CURE having 35% versus 52%. And this difference is widened in the higher grades (18% CURE and 41% Udelar).

Table 4

Comparison of females and males by grade: CURE and Udelar

Grade	CURE Women	Udelar Women	Men CURE	Men Udelar
Gº1	68%	58%	32%	42%
G°2	64%	59%	36%	41%
G°3	35%	52%	65%	48%
G°4-G°5	18%	41%	82%	59%
Total	53%	55%	47%	45%

At CURE, 40% of the teachers who belong to the full-time program are women and 60% are men. At the Udelar level, these figures are 49% and 51% respectively. In addition, working conditions at CURE are more precarious for women than for men. Sixty-three percent of contracted and interim teachers are women, while 60% of the effective teachers are men.

Clustering has shown to be a useful tool, with both techniques, showing the presence of 2 well differentiated groups in the CURE teaching community, where it can be seen that the differences between them are consistent with the gender inequalities present in the scientific community of the country, particularly in Udelar. In conclusion, we can affirm that vertical segregation, the accumulation of women in positions and lower levels of stratification of scientific systems, and their consequent underrepresentation in higher hierarchical positions, is deepening in the CURE.

As a final reflection, we can say that women have been left behind in the scientific environment, as in so many other areas, for the most diverse historical, social and cultural reasons. A substantial body of literature has been developed that illustrates the numerical numbers of women in science and technology at various educational and professional levels. All the data coincide in the scarce participation of women in decision-making and power areas. In recent decades, numerous political movements of resistance to oppression and for the recognition of new rights, new actors and new strategies have emerged. The paradigm shift regarding the representation of women, in society in general and in the scientific community in particular, is an absolutely necessary imperative so that science is not identified with a single gender and for which it is worth fighting.

In the words of the Rector of Udelar Ec. Rodrigo Arim (Universidad de la República, 2021):

> Gender inequality is an evil that affects all societies, and Udelar is not exempt from this problem (...) Gender inequality is present in multiple forms and in multiple expressions. Recognizing this problem is, above all, an ethical obligation of the institution and a measure to address its resolution in the medium and long term. (...) We are the institution that produces the most knowledge in Uruguay, and in this sense we have the responsibility to focus on this problem and find internal and external solutions, for the University and for society (...) to effectively advance in the eradication of these inequalities. Representation is key to making the issue visible.

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