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An Interdisciplinary Scientific Education, from Relevant Social Problems such as Sexist Hate Speech

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Abstract

The intention of this communication is to share an experience in initial training of Secondary Education teachers, in which teachers from different areas of university knowledge participate. The training programme is organized around the design of an Integrated Project based on Mathematics, Social Sciences and Philosophy curricula. The theme of the project focuses on a social problem which involves the dissemination of current of sexist opinion in social networks, the media and popular culture; in the form of hate speeches.

Integrated Projects are designed based on the identification of hate speeches of a sexist nature, with the aim of making the educational proposal contemplate its analysis. They also seek to develop counter-narratives which allow us to educate scientifically as an exercise towards achieving a critical and sensible environment.

The commemoration of the International Day for the Elimination of Violence against Women will allow us to implement, in real educational contexts, the designed projects, as well as developing skills for educational action-research.

The subject "Teaching Innovation and Initiation to Educational Research", is structured to train future teachers as critical curricular agents, committed to teaching science to everyone in a responsible way

Keywords: *teacher training, integrated curriculum, hate speech, sexism.*

1. Introduction

The educational proposal laid out is organized around the design of an integrated project, based on the Mathematics, Social Sciences and Philosophy curricula. Namely, it is developed in the subject of "Educational Innovation and Initiation to Educational Research", within the training plan of future teachers of Secondary Education as critical curricular agents, committed to educating towards a citizen's science.

The integrated projects have been designed based on the identification of hate speech of a sexist nature, in order that the educational proposal contemplates its analysis, and therefore can develop counter-narratives supported by mathematical contents, which would allow the possibility for scientific education to create critical and thoughtful citizens. We will also observe that this kind of practice may help students to become aware of the need to adopt a social and interdisciplinary perspective in the classroom, and in doing so, develop the instrumental, functional and above all formative character that a quality mathematical education entails [1]. This will influence the potential of the teaching of the humanities, sciences and mathematics in order to achieve a scientific and technological literacy of the citizenship from a social and humanistic approach.

2. Curricular integration. The Integration of Mathematical and Social Thinking.

There are various ways of understanding curricular integration, the traditional interpretation sees education as a democratic social process [2]. Consequently, we must also assume that a scientific-mathematical education contains a social process at its core. This statement seems trivial, but the social, human and largely interpersonal nature of education is often ignored due to the rush of acquiring mathematical techniques and the desire to achieve an "efficient" scientific-mathematical education [3].

There are two models for curricular integration which discuss the following: Key concepts that structure disciplinary knowledge; Problems, topics or centers of interest that respond to social concerns. In the second case, a methodological position to work projects is established.

Mathematics is instrumental, formative, and functional. It is a subject found in virtually all fields of study not only in Science and Technology, but also in other seemingly unrelated disciplines such as Social Sciences, Music, Video Games, Poetry or Politics.

However, this formative character of mathematics is usually neglected in the teaching process, but it is still highly necessary to be able to offer a comprehensive training to the general population of the 21st century. [1]
Although it is also usually true that - from an educational perspective - certain forms of mathematical and scientific activity have been considered which favor the development and acquisition of general cognitive abilities (hence, the educational interest of its teaching). Almost all math and science curricula value this teaching for its formative nature. However, the formative values associated with mathematics and science are not exhausted in cognitive aspects since, as a global human activity, they are connected with norms and values and are also linked to the emotional sphere [4].

3. Experience in the training of teachers.

The participating university teaching staff has experience in training for the integration of disciplinary knowledge in the areas of Social and Mathematical Sciences in the Master's Degree in Secondary Education Teachers [5]. The projects were presented as a practical job-related problem, linked to the design and development of the integrated curriculum.

3.1 Contextualization of the Developed Experience

In the experience carried out, a total of 80 female and male students participated from the University Master's Degree in Elementary and Secondary Education, Technical College, and Foreign Language Teaching. The formative plan is organized around the design of an integrated project, based on the curricula of Mathematics, Social Sciences and Philosophy. The theme of the project takes on the social problem of the dissemination of different opinions streamed in the media, including social networks and conventional media, in the form of hate speech. It consisted of carrying out integrated projects with the students of Secondary Education in a public center of Malaga, for the celebration of the “International Day for the Elimination of Violence Against Women”.
The work groups put disciplinary ideas and concepts into practice for five sessions which acted as connection operators for the critical understanding of the issue at hand. The distinctive feature of the experience is that the integration did not occur by resorting to disciplinary methodological structures, nor among areas of similar epistemological conceptions such as Math and Science. It was brought together by converging mathematical and social thinking skills which were then used to address the spread of sexist hate speech in the media and on social networks. [6]

3.2 Results

The students were organized into 12 interdisciplinary groups. This may suggest that future teachers will have developed some autonomy and creativity in these areas. It also should be noted that they were able to identify their strengths and how to take advantage of them in order to achieve a good layout and implementation of the activity. By the very nature of the activity, they were able to clearly observe how it is possible to develop the functional - and of course formative - nature of mathematical education.
Tablet 1 shows the hate speeches chosen by these 12 groups and highlights the mathematical content they used to build counter-narratives. It also briefly describes some of the activities carried out.

Tablet 1: Hate speeches and activities

Groups	Identified Hate Speech. Mathematical Content Used. Brief Description of the Proposed Activities for the Development of a Counter-Narrative
Applicad@s	Social Invisibility of Women. Graph Theory. Multiple questions are raised to generate debate around what is the invisibility of a collective group, specifically that of women. The responses are gathered with Post-it notes and a graph is made using the ONODO application. Link: https://onodo.org/visualizations/53877
REMIX	Women in Sports. Percentages and Bar Graphs. The students analyzed different sport activities using percentages and bar graphs. They addressed the different kinds of sports in which they and their peers participate, clearly indicating certain patterns among girls and boys in this field.

Caminantes	Women Mathematicians Hidden from History. Irrational Numbers. The activity was carried out by 12-year-old students who had yet to learn irrational numbers. They were given an analogy between women hidden in the history of mathematics and the existence of irrational numbers. This awoke a sense of surprise and curiosity from the students (in both a mathematical and historical sense) and encouraged them to continue research on the life and work of these women.
MIH	Microaggressions in Everyday Life. Mathematical Modeling. The students were faced with a “Modeling” problem regarding the economic benefits - which may be subtle and difficult to notice at first - of a bar or club that uses the strategy of free admission for women.
GLOBE	Women in Professional Sports. Statistics. A statistical survey was carried out which revealed, through numerical evidence, the hate speech that is generated day after day in the press and social networks, regarding the role of women in professional sports.
DES-tereotípos normalizados	Stereotypes. Normal Distribution. The students classified the lyrics of several songs as “sexist content”, “romantic myth” and “healthy”. This classification was then analyzed and observed according to Gauss’ normal distribution or bell distribution. This in turn generated a debate which revealed that many of us “normalize” negative gender stereotypes in our daily lives and in our emotional-personal relationships.
Powers-Rangers	Toxic Relationships. Whole Numbers. The activity is carried out with students who are working on whole numbers. Its aim is to draw an analogy between the positive and negative numbers with toxic or positive behavior in a relationship.
Perestroika	Music and Dance. Statistics. The presence of women in major music and dance festivals is statistically analyzed. It shows that the role of women is almost nonexistent, and mostly presented in a degrading way that generates further hate speech.
Inclusiv@s	Gender Violence. Percentages. Press clippings are analyzed which show the percentages dealing with women who have been murdered by their male partners.
Diversitarias	Comments on Press Headlines and Social Networks. Whole Numbers. The words that appear in press clippings or found online in social networks are classified as positive or negative. An analogy is then made using whole numbers.
Random	Career and Job Stereotypes in Advertising. Percentages. Advertising clippings are shown which detail various job stereotypes as well as the percentage which corresponds to professions that are seen as either masculine or feminine.
Cambio docente	Housework. Monetary Value. A graph with the monetary value of different household tasks is shown. Students are asked to fill out another graph by gathering specific information of the tasks that are performed in their households. Lastly, a debate is generated after sharing the results.

4. Conclusions

In general, the results were satisfactory, as they promptly and smoothly reached the interconnection of different conceptual structures which can be converted into teaching knowledge.

Ultimately, it proved to be a relevant practice not only for curricular integration, but also for enhancing culture by mathematical means. It can be used as a tool by the teachers in training for understanding hate speech and gaining a personal and critical awareness of the issues at hand [3]. Mathematical reasoning has been successfully determined as a fundamental cultural value as it provides a more complete understanding of relevant social problems.

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