HISTORY OF MATHEMATICS AS A TOOL TO EDUCATE FOR ANTI-RACISM

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ABSTRACT

In the present paper, we analyze how the history of mathematics – and that of STEM disciplines in general – can become an effective tool to educate and heighten awareness about the Memory of the Shoah, with the aim of promoting an antiracist attitude. Several actions to achieve this goal have always been conducted in schools within the humanities. However, we would claim the important role assumed by the history of science in this perspective, starting from the analysis of some educational activities proposed in schools within the project *'Mathematics knows no races or frontiers'*. *Ideas for historical-mathematical reflection for an antiracist education*.

1 Towards an antiracist education

While the awareness towards the Shoah had always been prerogative of humanities in educational context, only in recent years it emerged as unspoken potential of scientific disciplines. Hence, we would discuss the opportunity and the impact of introducing these issues in schools starting from a different perspective, the one of the history of mathematics and the history of science. The need to promote antiracist attitudes among the youngest stems also from the increasing episodes of intolerance. The growth of migration flows and the persistent economic difficulties have risen concerns at all levels regarding the return of racist and xenophobic attitudes among the Italian population. In the last few years, the national monitoring centre denounced the spread of acts of intolerance against those who are regarded as 'different' for reasons of ethnicity, race, religion, gender, sexual orientation, physical or mental disability. A substantial percentage of these acts takes place in schools and, having the younger generation as protagonist, is amplified by social networks. The task of educating to inclusion and antiracism, also included in the goals of the United Nations' action program "Agenda 2030" in connection with the development of global citizenship, is one of the most compelling challenges of our educational system. Although there are several initiatives in this direction, they are often piecemeal and fragmented and there is the risk of 'losing' their true meaning.

The best practices of didactics of the Shoah stress that racist preconceptions essentially spring from ignorance, and only thanks to the knowledge of what happened in the past it is possible to acquire the tools needed to identify and combat the symptoms of intolerance. The national guidelines Per una didattica della Shoah a scuola⁸⁸ identify the interdisciplinary and transcultural perspective as the root cause that makes the anti-racism education one of the most complex educational challenges, since it involves different skills and specializations. Conversely, the cross-cultural dimension invoked is typical of the multidisciplinary approach of the history of science and mathematics. Because of their universal language, which transcends every race and frontier, STEM disciplines lend themselves well to develop these themes. A good teaching of the history of scientific disciplines can contribute to counter the cognitive-essentialist bias which underlies the racist views of new generations (Corbellini, 2020; Rutherford, 2020). Historical-scientific research may become an educational tool and a carrier of public engagement aimed at 'disarming' false arguments, stereotypes and slogans which are often puerile but simple, and therefore effective (Castelnuovo, 1997; Segre, 2018). The plots of the internal history of STEM, can make the future generations aware of the instrumental use that was made of such disciplines, which are usually considered – by their very nature – impervious to ideological conditioning. In this regard, it is hardly necessary to recall that state racism in the German Reich and in the Fascist Italy, justified by the false myth of 'racial purity', broadly benefitted from the scientific support and the complicity of some men of science to promote forms of discrimination and persecution, besides to plan and perpetrate eugenic and/or extermination programs. However, the horizons of historical research regarding the correlation between mathematical, statistical, biological, medical, psychiatric sciences and racisms did not end with the Short Century and have been progressively extended to the short and long term, in a perspective of connected history, taking into account social Darwinism, the relationships racism-colonialism, science-apartheid, etc.

⁸⁸ i.e. For a didactics of the Shoah in schools.

2 A response to local needs

Our project fits in a well-defined context, that of Piedmont, whose chronicle has recently recorded many serious acts of racism and anti-Semitism: writings on walls, drawings of swastikas, insults of despicable violence, which bring back in vogue the most forbidden Nazi-fascist stereotypes. These are intolerable facts for a society that wants to be inclusive, free, and democratic, and even more for a city like Turin, Gold Medal of Resistance. The perception that these are not isolated episodes and the consequent concern about the surfacing of forms of hatred that make the past dramatically close, are reflected in the statistical data: from January 1, 2018, to the end of February 2019, 118 acts of racism were reported in Piedmont, 36% of which in Turin and its metropolitan area. In 8% of cases, they occurred in a school context. On the other hand, according to IRES Piemonte annual report for 2020, only 13.67% of the population considers racism and other forms of discrimination to be of concern and, due to Covid-19 emergency, this percentage dropped to 9.5% in 2021. In the same year, however, there was a 13% increase in acts of intolerance compared to the previous year. In our region – but also in Italy in general - it is regrettable to note the scarcity of proposals and materials concerning STEM disciplines, whose ancient and recent history can make a valid contribution to a deeper understanding of this issue. This is even more regrettable considering that the Piedmontese scientific community was among those most affected by the racial laws of 1938 (Capristo, 2014; Luciano, 2018). Hence, came about the idea of the Research Group in History of Mathematics at the University of Turin (coord. by prof. Luciano) to design educational activities and training courses to sensitize teachers and students to Memory and awareness, starting from the critical re-reading of some aspects and moments of research and teaching of mathematics and science during the fascist dictatorship and motivating the direct involvement in research of sources and investigation of facts. Delving into the historical past, studying and analysing it with the typical lucidity of scientific thought and logical-deductive argumentation is a significant operation also in relation to our present and to the multi-identity and multi-ethnic society in which we live.

3 Educational activities

In the school years 2020-21 and 2021-22 three schools were involved in the project. During the first year, students (8th degree) of the lower secondary school "U. Foscolo" in Turin delved into the personal and professional trajectories of scientists who were victims of racial persecution and experienced the effects of state anti-Semitism, reading and commenting on the correspondence of that 'dark' period. In the following year, they focused on the impact of racial laws in Italy on the lives of female mathematicians and scientists. The fates of women examined were divided into three macro-scenarios: emigration, permanence in Italy in hiding, and deportation to concentration camps. In both cases, to make their research accessible to a wide public, students created a freely navigable multimedia content which was published on the school website on the Holocaust Memorial Day.⁸⁹

Two different paths were taken by the two high schools that took part in the project. At the IIS "Santorre di Santarosa" in Turin, three classes (11th-12th degree) with biochemistry study address opted to focus on the eighteenthcentury debate on polygenism and racism and on the instrumental use of mathematics (statistics, demography, ...) and science (biology, anthropology, medicine, ...) to justify colonialism, racism and anti-Semitism, in modern and contemporary times.⁹⁰ In addition, some students were involved in deepening the figure of three scientists who lived during the Nazi-fascist period, chosen in relation to their address of study: J. Mengele, E. Segrè and R. Levi Montalcini. Another class began with the history of the school: its building is one of the finest examples of Fascist-era architecture in the city of Turin, with a Littoria Tower identical to that of the city's central square. Starting from the local context, they analysed the effects of the racial laws on the city of Turin with special attention to scientific faculties.

At the Liceo "G. Peano" of Cuneo, the Mission Memory path was pursued: teachers and students rediscovered personal and professional trajectories of their colleagues who were persecuted for racial reasons, with particular focus on the partisans struggle in the Langhe. After having listened to the testimony

⁸⁹ The final products are available online at the links below. <u>https://www.icfoscolo.org/wp-content/uploads/2021/01/MOOC_Giornata-della-Memoria.pdf</u>. <u>https://www.icfoscolo.org/wp-content/uploads/2022/01/Scienziate-ebree_MOOC.pdf</u>

⁹⁰ To consult their work, see <u>https://www.dropbox.com/sh/17xeqssf4dfgvse/AABPWWTa-HqxMl63gyUkGzuHa?dl=0</u>.

of the Montanari family, one of the oldest Jewish families in Cuneo, and having discussed with the scholar of Judaism A. Cavaglion, they privileged the historical events linked to the territory. Older students (13th degree) wanted to pay tribute to two of the many scientists of Jewish origin who brought fundamental developments to their disciplines and were affected by the consequences of racial laws: V. Volterra and T. Levi-Civita. Starting with archival research, younger students (11th degree) focused on the reconstruction of the biography of Ugo Levi, who taught mathematics and physics in Saluzzo in the historical period considered. They also interviewed some of his former students (B. Segre, an engineer, and A. Bosi, in turn then professor of history and philosophy at the same school) to learn more about his personality as a teacher and how he was affected by the anti-Semitic wave that swept through Fascist Italy. At the end of this path, a web page was created, containing the research and reflections of the students, with the aim of disseminating the results and to give back to the territory a piece of its history (https://liceocuneo.it/progetto-pls/). This project was likewise an opportunity for a rapprochement between retired and current teachers and students and for a rediscovery of their roots.

4 Conclusive remarks

Despite the limits of a temporally limited intervention, positive results in terms of appreciation and involvement of schools indicate the usefulness of continuing the path of Shoah education also from the perspective of history of STEM. According to the feedbacks of teachers and students, some aspects are particularly significant. Firstly, this kind of awareness-raising to the Memory of the Shoah can ensure a more inclusive and interdisciplinary didactic approach and can be declined in many ways and at different school levels. At the same time, it contributes to promote social integration and cultural inclusion of students from fragile backgrounds: indeed, reflecting on past forms of discrimination can help to avoid repeating the same mistakes in the present.

Secondly, these experiences reveal the effectiveness of dealing with historical sources: beyond their intrinsic importance, they captivate students, thus facilitating a major level of commitment. The analysis of historical documents was appreciated by the students as they 'got closer' and empathized with those who experienced first-hand the effects of state anti-Semitism and, from these readings, developed some reflections on today's context, actualizing what they learned.⁹¹ Moreover, such critical reading helps to make mathematics and science living subjects in students' eyes.

Lastly, educating for tolerance is notably significant relating to civic education: learning to appreciate other people and their differences is one of the key skills of the rising generations of citizens. To this end, history of STEM becomes a resource, a vehicle for improving students' consciousness: "history is something that can make us aware of who we are, and how we have come to be the individuals that we are" (Radford, 2014, p. 89).

The history of mathematics and STEM disciplines, hitherto little involved in the field of antiracist education, can therefore provide an important means of combating ignorance, with the goal of defeating racial discrimination and intolerance, and can contribute to identify appropriate antiracist resources to incorporate into school curricula. We hope that the ideas, insights and experiences illustrated can form a basis for new educational actions in this direction, which are especially needed in our society, crossed by currents of racial hatred and contempt for diversity.

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⁹¹ In this regard, some student comments are given here: "In the letters you can see that Jewish scientists tried to find work even in a place far away from where they worked, taking their family with them, because they were thinking about their children and their future."; "It is important to understand that it doesn't matter if you follow a different religion or speak a different language from others because we are all equal."; "What happened to the Jews certainly must not happen again because we have to think about what they had to suffer and that there were too many victims who died unjustly.".

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