

Italian Mathematics Prison Teachers' Perspective on the Teaching/Learning of Mathematics in Prison School

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Abstract: *Teaching in the prison context is characterized by a high complexity level; it is a multifaced activity influenced by several factors depending on the specific context. We present a preliminary but overall picture of schooling in Italian prisons by considering teachers' reflections regarding their experiences in teaching mathematics in correctional facilities. To address the gap in the current literature on this issue, we conducted a SWOT analysis on the reflection provided by a group of nine Italian mathematics teachers who teach in different prisons and with different experiences and backgrounds. Their reflection allowed us to identify and describe six theory-driven categories and five data-driven categories to characterize the teaching of mathematics within Italian prisons. Some of these characterizations are considered both as positive and negative aspects by the teachers, while other categories are more polarized and then constitute specific threats or opportunities in the prison context.*

Keywords: *education, school, prison, teaching, mathematics*

Introduction

Teaching in nontraditional settings, such as correctional institutions, is vastly different from teaching in traditional education contexts. Indeed, the limitations provided by the institutional context require adopting different approaches to usual adult education. For instance, Ahl and Helenius (2021) report that, in Swedish prisons, teaching is organized as individualized instruction through distance education, with students and teachers communicating through an intranet and via a telephone. Furthermore, in Sweden, the courses run continuously without a specific calendar. In other countries (e.g., the United States), there can be an Education Department within the penitentiary facility, including small classrooms, libraries, and computer rooms where students gather for classes and individual studying sessions (Kilgore, 2011). In several cases, the same curriculum for adult education is adopted in the prison context (Kilgore, 2011; Maffia & Decembrotto, 2022), while in other countries a specific curriculum is adopted, but several authors lament that the conventional prison curriculum ignores the age of learners, their cultural backgrounds, and prior negative school experiences (Chrysikou et al., 2023; Stathopoulou et al., 2024).



In any case, teachers approaching education in correctional institutions are required to learn how to navigate the unfamiliar system and then work within it to achieve the goals and outcomes proposed by the educational system. Therefore, as teachers operate between educational and institutional spaces daily, they often encounter difficulties and worries related to the correctional context that are not always faced in traditional educational places.

Some of the difficulties teachers encounter in this context mainly concern the challenges of integrating education into the prison context. After arriving in the prison context, teachers are pushed to experience a form of cultural shock (Wright, 2005; 2008) by learning how to work within and between different prison cultures (Patrie, 2017). As there is sometimes a lack of communication between the correctional administration and the teachers, education in prison is commonly seen as a not entirely necessary part of prisoners' lives. As pointed out by several authors (e.g., Irwin, 2008; McAleese & Kilty, 2008; Weaver et al., 2020) very often lessons are cancelled either when the prison institution needs space, time, and personnel or even when some students may be removed from the classes for punishment or other reasons. The learning environment is also disrupted when penitentiary staff enters and breaks class spaces (McAleese & Kilty, 2008), thus becoming the correctional officers themselves a "major obstacle in providing school education to students" (Flores & Barahona-Lopez, 2020, p. 7). In addition to these difficulties, in correctional institutions, it can also happen that teachers have to deal with inadequate teaching spaces, obsolete teaching and pedagogical materials (Lukacova et al., 2018) or are forced to ask the prison principal for authorization to bring new teaching materials into their classrooms (Weaver et al., 2020).

Teachers' difficulties can also be related to the management of the heterogeneity of the class group. Indeed, class groups in correctional institutions are, in most cases, very heterogeneous since students may present a variety of educational backgrounds, different levels of alphabetization, and different life experiences (Flores & Barahona-Lopez, 2020; Lukacova et al., 2018). This implies that teachers must regularly deal with different situations related to the reality of correctional places and students' lives outside the prison and consequently modify their teaching methods and goals. Teachers are called upon to deal with the difficulties that arise from the complexity of students' previous experiences (Wright & Gehring, 2008): they have to carry out a kind of "emotional labour" with students in such a way as to become a safe person for students to address and speak openly about their traumas (Flores & Barahona-Lopez, 2020). According to Patrie (2017), these difficulties can lead teachers to question their relationship with the penitentiary administration, their way of interacting with the prison system, and their role in guaranteeing students' instruction.

The study presented in this paper is part of a larger Educational Design Research (EDR, McKenney & Reeves, 2018) project called "Learning Math in Prison". The aim of this project is to develop design principles for teaching materials for mathematics in Italian prison schools. As usually happens for EDR projects, the research process begins with an exploration of the context (McKenney & Reeves, 2018). This article presents the outcomes of this first step of the study which aims at describing the practitioners' perspectives (in our case, teachers' perspective) about the context in which they operate. Indeed, as McKenney and Reeves pointed out (2018, pp. 78–79), "collaboration with practitioners is sought to shape a better understanding of the educational problem to be addressed, the target context, and stakeholder needs". As it will be further detailed in the Methods section, we sought to understand Italian prison teachers' perception of constraints and possibilities within the Italian educational system in prison. Thus, the research question guiding our research endeavour is: Which is the Italian mathematics prison teachers' perspective about the context in which they work? We will categorize the strengths, weaknesses, opportunities, and threats they perceive in relation to their teaching in Italian prison schools.

Prison Education in the Italian Context

The Italian Constitution, in Article 27, specifies that the function of the penalty is to re-educate the detainees, entrusting them to the elements of treatment defined by the penitentiary system - education, work, cultural, recreational, and sports activities, contacts with the family and those with the outside world - the foundations for the construction of a new life project for the convicted person. Consequently, the establishment of appropriate paths of cultural and professional growth during the period of imprisonment represents a fundamental tool for the promotion and development of the inmates' personality with the perspective of social reintegration. Thus, education is, on the one hand, one of the activities aimed at the reintegration into society

of the detained person and, on the other hand, it represents an essential tool for supporting a path of personal growth and maturation.

Education in prison has a potentially considerable number of students. Official data from the Italian Ministry of Justice report low levels of education among people in prison (based on the recorded educational qualifications), and the situation is unknown for over 40% of the prison population (Maffia & Decembrotto, 2022). For example, the Ministry of Justice indicates that, as of June 30, 2024 (the most recent data available), out of 61,480 people in prison, information was unavailable for 30,523 of them. Adult schooling in Italy is organized in three stages: basic literacy in Italian, first period (equivalent to grade 8 Italian standards), second period (corresponding to Italian compulsory education standards). It is implemented by institutions called CPIA ("Centri Provinciali per l'Istruzione degli Adulti" – Provincial Centers for Adult Education); among their functions, they ensure education in prisons. Schooling is usually organized in small class groups attending classes in dedicated spaces within penitentiaries. During the first and second periods of instruction, each class group attends at least classes in Italian language, Mathematics, and a second European language. CPIA may also organize additional activities to provide education for different subjects. Many persons in prison hold the need – as well as the right – to access schooling. Considering only the first and second periods of schooling, less than half of the students successfully complete their educational path. Referring to partial data from the Ministry of Justice regarding the 2022/2023 school year (the most recent data available), out of 11,025 students enrolled in basic literacy in Italian, first and second period, only 37.6% successfully completed their educational path. There is a severe issue of inclusion concerning accessibility, participation, and achievement.

Each prison has distinctive characteristics that make the educational experience and the school organization not entirely comparable to others. The presence of students with definitive sentences or pending judgment, those with short or long sentences, and the existence of separate sections (e.g., women's sections, justice collaborators, etc.) are all factors that impact the organization of the school. Furthermore, the prison administration has a lot of discretion with respect to the choice of schedules, the accessibility of school facilities (libraries, computer rooms, etc.), and the admissibility of materials, to name a few examples.

Method

As mentioned above, the present study is part of a larger EDR project. It refers to the initial analysis and exploration of the context of research. In the following, we introduce the participants, the instruments, and the methods for data collection and analysis related to the specific study presented here.

Sample

The research project "Learning Math in Prison" encompasses five universities and three CPIAs across Italy: one in Ancona, one in Milan, and one in Bologna. All Mathematics teachers of these three schools in prison were invited on a voluntary basis to participate in the project. Thus, we identified nine volunteer teachers with at least one teacher from each school. Thus, our sample is a convenience sample (Cohen et al., 2007).

All the nine teachers involved have a master's degree in a scientific subject (Chemistry, Biology, Geology, ...). Although none of them hold a degree specifically in mathematics, they are all formally qualified to teach mathematics and science in the school year group in which they work, according to the Italian teaching certification system. Indeed, teaching mathematics and science in Italy is possible with a degree in mathematics or another scientific discipline. As usually happens in the Italian context, none of them received specific training for teaching to adults, foreigners, and/or in the prison context. The sample consists of teachers with different experiences in prison teaching, varying from 1 year to over 20 years.

All the teachers agreed on participating in filling out the Padlet (see next sub-section), while only seven of them took part in the online meeting. Anyhow, in both phases, all three school contexts were represented. The nine teachers who filled the Padlet were not distributed evenly in the three prison contexts: one of them was from Ancona, four were from Bologna, and four were from Milan. The online meeting involved seven teachers: one from Ancona, four from Bologna, and two from Milan.

Data Collection

Data collection was realized using the SWOT framework, thus focusing on Strengths, Weaknesses, Opportunities, and Threats for teaching mathematics in the prison context. SWOT analysis is a strategic management tool designed to frame planning by focusing on internal factors (Strengths and Weaknesses) and external factors (Opportunities and Threats) affecting the situation being investigated, using a 2×2 matrix (Helms & Nixon, 2010; Fig. 1). This framework is usually adopted by organizations to leverage their strengths and to capitalize on new opportunities while acknowledging how weaknesses may impede progress or exacerbate potential threats.

Figure 1

Schematic representation of the SWOT matrix.



Extensively embraced in the field of education, the SWOT framework is a tool for strategic planning and decision-making, especially in scenarios that require a comprehensive analysis of the perspectives of various stakeholders (Zhu & Justice Mugenyi, 2015).

The goal of the present study is to obtain a picture of practitioners' perceptions of schooling in their prisons, considering that it is a multifaceted and complex issue that has not yet been deeply explored in literature (Ahl and Helenius, 2021; Chrysikou et al., 2023; Decembrotto, 2015; Decembrotto & Maffia, 2024; Kilgore, 2011; Maffia & Decembrotto, 2022). For this aim, we decided to start from the direct experience of the practitioners by bringing out all the aspects they perceive as relevant and important.

To gather teachers' views, they were asked to fill out a Padlet (Figure 2). Padlet is a digital platform that allows multiple input modalities. Teachers had the opportunity to post their ideas in the Padlet and comment on their colleagues' posts. They had individual access to the Padlet where they were asked to enter posts in four sections, each corresponding to one of the SWOT dimensions, each introduced by a brief description:

- Strengths - Characteristics that distinguish your school in a positive sense; aspects that support your work;
- Weaknesses - Characteristics that make your work more difficult and could be improved;
- Opportunities - Opportunities offered by the environment in which you work that are not directly dependent on you but can be taken advantage of to benefit your work;
- Threats - External difficulties that threaten the smooth functioning of your work but are not directly dependent on you.

In the Padlet, some thought-provoking prompts were written in a fifth column so that respondents could use them as a starting point for their own reflection. More precisely, the prompts were: Motivation to study; Equipment; Classrooms; Mathematics Curriculum; Absence of standardized testing; Role and purpose of education in prison; School-prison relationship. These themes were identified as relevant issues by the researchers based on:

- the literature consulted (e.g., Ahl and Helenius, 2021; Chrysikou et al., 2023; Decembrotto, 2015; Kilgore, 2011; Stathopoulou et al., 2024);
- previous research experiences within Italian prisons (e.g., Decembrotto & Maffia, 2024; Maffia & Decembrotto, 2022);
- the analysis of institutional documents regarding the planning of the educational offer provided by the schools involved.

In this first phase, teachers were invited to post their ideas and reflections related to one of the thought-provoking prompts (or to other issues they considered relevant) about their experience concerning the

school in prison and their teaching in this context. In this phase, each teacher was able to see only his/her own posts. Afterward, all the posts were made visible to each other. In this phase, we asked teachers to read and comment on posts by colleagues.

Figure 2

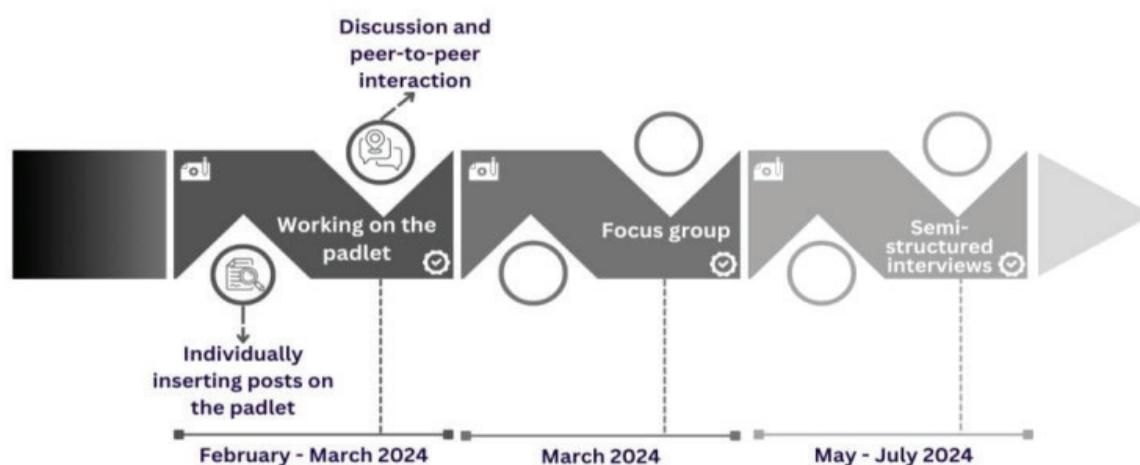
Screenshot of a portion of the Padlet (translated in English from Italian).



Finally, we invited all teachers to participate in an online meeting to discuss the themes emerged from the Padlet. The online meeting was organized by the researchers after a preliminary analysis of the Padlet. Figure 3 shows the timeline of the data collection process: we started by gathering reflections from the teachers involved via Padlet, then we continued with an online focus group, and finally we carried out semi-structured interviews.

Figure 3

Timetable for data collection.



The themes emerged from this initial analysis were organized into categories (as better described in the following section). Among them, the researchers selected some themes to be discussed during the online meeting. The aim of the meeting was not to find new categories but to refine the definitions of those categories that emerged from the preliminary analysis of the Padlet and which interpretation remained ambiguous for the researchers. In particular, the themes discussed during the meeting were the following:

- Motivation to study which was one of the thought-provoking prompts provided on the Padlet;
- Role of the assessment in the prison context, considering summative assessment and formative assessment.

The meeting lasted around one hour was conducted online using the Google Meet platform. It was audio- and video-recorded and the researchers' field notes taken during the meeting enriched the data.

Data Analysis

The analysis has been conducted according to the principles of qualitative content analysis (Cho & Lee, 2014; Creswell, 2013; Denzin & Lincoln, 2018; Hsieh & Shannon, 2005). This method can be referred to as "a research method for subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005, p. 1278).

In the first phase of our analysis, we considered the thought-provoking prompts provided in the Padlet to be a-priori categories. As already explained, the thought-provoking prompts were identified based on previous research experiences in Italian prisons and by considering research literature and institutional documents (*theory-driven categories*).

We foresaw that, in a subsequent phase, new categories could emerge from our data analysis. These data-driven categories were necessary to code the posts of the teachers' observations that did not fit just in the theory-driven categories established. Our coding procedure followed an inductive approach (Cho & Lee, 2014) and we chose to examine both the explicit content and the implicit, underlying meaning of the data (Graneheim & Lundman, 2004), aligning with the idea that qualitative content analysis is appropriate for data requiring a certain degree of interpretation (Schreier, 2012).

Thus, the analysis process, aimed at coding teachers' post in the Padlet, followed these steps:

- Five researchers made a parallel independent coding of the data from the Padlet using the theory-driven categories and, at the same time, each of them drafted possible new data-driven categories.
- Researchers compared the outcome of their coding and discussed them in dedicated meetings aimed at reaching agreement about the coding of each post (each post could be coded with more than one category). Discrepancies between researchers in the coding process were addressed through iterative discussion. After the initial phase of independent coding, the researchers met in multiple sessions to compare their analyses and collaboratively resolve disagreements. These discussions aimed to reach full consensus on the categorization of each post, in line with an interpretive and negotiated approach to intercoder reliability commonly adopted in qualitative research (Creswell, 2013; Graneheim & Lundman, 2004). Rather than calculating statistical agreement indices, which are less suitable for this kind of interpretive coding, we prioritized a dialogic process of meaning negotiation, ensuring that all coding decisions were grounded in shared understanding of the data.
- New data data-driven categories were identified elaborating on the individual drafted ones until unanimous agreement was reached.
- This process also led researchers to remove certain theory-driven categories as they were not sufficiently represented in the posts collected using the Padlet, i.e., they were present in fewer than three posts.

Finally, the definitions of those categories on which total agreement was not yet reached, were further refined by analyzing teachers' reflections during the online meeting. The definitions of the categories as presented in the following section represent the outcome of the entire process.

Results

Teachers responded to the Padlet by publishing 64 posts (17 about Strengths, 19 about Weaknesses, 16 about Opportunities, and 12 about Threats). Later, when the Padlet was opened to the possibility of commenting, 13 short comments were added under as many posts, most of them aimed at expressing agreement and emphasizing the content.

Even if the request proposed to teachers explicitly referred to mathematics teaching, we observed that

few posts focused on mathematics, while almost all observations collected were more general in nature. Some of the posts written by teachers were short and to the point, but many of them were very rich and covered multiple themes. As a result, many posts were classified as adhering to more than one category simultaneously.

Categories

This section will present and exemplify the categories derived from our analysis. Synthetically, the theory-driven categories described through our analysis are:

- **Motivation to study:** students' relationship with study, in general, and with educational institutions, including the purpose they find in studying;
- **Equipment:** presence and quality of technological equipment in classrooms, instructional materials allowed in the classroom (or in the cell), textbooks, etc;
- **Classrooms:** adequacy of spaces used for teaching activities;
- **Curriculum:** explicit mention of the mathematics curriculum, also, as time scheduling, methodologies, and strategies to foster learning;
- **Role and purpose of prison education:** goals of education in the prison setting;
- **School-prison relationship:** relations between school and prison leadership, or school and prison staff; contrasts between the needs of the two institutions.

The data-driven categories, i.e. those emerged from the analysis of the teachers' reflections, are described as follows:

- **Class-group composition:** characteristics of students both from the point of view of numerosity and heterogeneity, high turnover, specific needs, and any difficulties encountered (social, cognitive, relational ...);
- **Attitude toward the subject:** matured relationship with mathematics (with reference to previous experiences) in terms of metacognitive aspects such as emotions, view of mathematics, and sense of self-efficacy;
- **Assessment:** assessment whether internal or external, formative (e.g., monitoring, documentation) or summative (e.g., testing and certification);
- **Relationship with the local community:** relationships with associations (e.g., voluntary) or entities in the territory (e.g., local government), the activity they carry out in the prison and the effect (positive/negative) that they have on school activity;
- **Personalization:** individualization and/or personalization of teaching and/or training paths for students, including with reference to their flexibility (Shemshack & Spector, 2020);
- **Other:** human relationship between student and teacher; logistical and/or organizational problems; teachers' schedule; continuity of studies.

A first observation to be made about this categorization is how it is distributed between Strengths, Weaknesses, Opportunities, and Threats. Among the Strengths, the most frequent category is Personalization (35% of posts), while the least present is Attitude toward Mathematics (1 out of 17 posts). Among the Weaknesses, the most frequent categories are Equipment and School-prison relationship (37% of posts), and Class group composition (32%), while Evaluation is absent. Among Opportunities there are frequent references to Personalization (44%) and Motivation to study (38%); while references to Classrooms and Attitude toward mathematics are absent. Among Threats, there is a preponderant reference to the School-prison relationship (75%), and a notable presence of Class-group composition (present in one-third of the posts), and no presence of other categories.

Table 1 shows the categories that emerged from the analysis and their distribution according to the SWOT dimensions (Strengths, Weaknesses, Opportunities, Threats). Each category is reported in the dimension(s) in which it appears, based on the content of the teachers' posts on the Padlet.

Table 1*Category Distribution among the Four Dimensions of SWOT*

Category	Strengths	Weaknesses	Opportunities	Threats
Motivation to study	3	3	5	0
Equipment	2	7	1	1
Classrooms	2	3	0	1
Curriculum	3	2	4	0
Role of prison education	5	1	4	1
School-prison relationship	2	0	2	9
Class-group composition	3	5	4	3
Attitude toward mathematics	1	2	0	0
Assessment	3	1	1	2
Relationship with local community	2	1	4	2
Personalization	4	1	7	0

Below, we describe the categories in detail and summarize how the respective themes were addressed in the teachers' reflections.

Motivation to study

This category is considered by teachers both as negative and as positive. On the one hand, low motivation to study is detected, especially toward mathematics, due to previous negative school experiences or poor schooling, especially when students have foreign origins. On the other hand, positive motivation to study is detected in relation to finding a better job; opportunities for exchange and socialization; potential personal growth; and to the divertive function of schooling, particularly mathematics, which forces aside other thoughts and concerns. For instance, teachers write: *“The prisoners are not just students, they must live with guilt, homesickness, anger, anxiety [...]”* and *“The school in prison is a fundamental element of the rehabilitation pathway for the future reintegration of the imprisoned person into society. It is a place for socialization, confrontation, acceptance, and reflection, as well as learning”*.

Among the external factors influencing students' motivation, there are those linked to obtaining a school certificate or the recognition of good conduct for a possible sentence reduction. This type of motivation can be a double-edged sword: some students may be not motivated to attend a course if it does not imply a formal qualification. In such cases, to keep the motivation to study mathematics high, teachers must help students by constantly showing them the functionality and usefulness of studying mathematics in relation to their education.

Equipment

Equipment is described with positive and negative aspects. This classification strongly depends on the specific school context in which the respondents work.

In many cases the problematic aspects are related to the insufficiency and the inadequacy of the materials available, both in terms of classroom equipment and as teaching materials: *“In many cases, the limitations linked to the detention situation reduce the material available to chalk and blackboard”*. Furthermore: *“Only one classroom has a screen with a projector and an [interactive whiteboard] (not updated and apparently unusable)”*.

Particular emphasis is given to the inadequacy of textbooks: *“Some math books are often very and uninteresting. [...] (the one adopted by us is in black and white)”*.

In some situations, an adequate supply of interactive whiteboards and computers is reported, favoured

by good relations between school and prison directors: *“In the men's pedagogical area, a computer room with 10 PC stations (without Internet connection) is set up; six classrooms are equipped with interactive whiteboards”*. Another teacher writes: *“There is a photocopier in the teachers' room. In the high-security area and in the women's section there are other [interactive whiteboards]”*.

Classrooms

The category related to classrooms is predominantly associated with negative features of places used for school activities: in this case among Threats and Weaknesses it emerged that classrooms are described as being small, dirty, and poorly equipped. On the other hand, only in two cases the classrooms offered by the different prison structures are recognized as strengths because they are adequate in number, spacious, and well-lighted, as, for example, reported in the following comment: *“Spacious and well-lighted classrooms at the third branch”*.

Curriculum

The category related to the curriculum is mainly associated with positive aspects and thus to strengths and opportunities.

The main critical issues identified concern the little time available: *“It can be a point of weakness because time is very limited (a middle school course lasts 400 hours and in prison they sometimes do less) and this forces you to make very drastic choices and prevents you from adequately in-depth analysis”*. Many refer to the different levels of student literacy and to high turnover, which are obstacles to the in-depth development of all the topics included in the intended curriculum.

The mathematical curriculum is experienced in a more flexible way with respect to school outside of prison, because of fewer external pressures: *“It can be a strength because you have fewer constraints coming from outside (director, families, colleagues) and you are freer to choose which fundamental topics to address and which activities to carry out”*. The need to personalize the paths based on students' experiences is proposed as a highly impacting factor: *“The high turnover of students [...] can be the starting point for a personalized curriculum, based on the skills already possessed”*.

Positive practices are proposed in the design of educational activities, which involve, for instance, hands-on and creative activities: *“Often in the lessons, the creative aspect of the prisoners comes out strongly, the desire for manual skill and concreteness on the one hand, but also a great curiosity especially regarding earth and space sciences. This could also be leveraged to design specific educational paths in the mathematics program”*.

Role and purpose of prison education

This category was mainly addressed by highlighting its positive aspects with few negative aspects. More specifically, the critical aspects focused on the lack of dialogue with the prison administration about the values and the importance of schooling in prison, even though the system guarantees the right to study: *“I believe that it could be useful to promote specific development and training activities for teachers, also jointly with prison administration staff, on topics of common interest, in order to foster and spread the sharing of values and professional behaviours consistent with the purposes of prison education and the training needs of the users”*. Moreover: *“The right to education is guaranteed, but prisoners are not always able to attend school, for logistical, personal, or other reasons”*. Thus, a need for joint training with the prison administration emerged.

In the cases mentioning the positive aspects of this category, the most relevant purposes of education in prison mentioned are the following:

- utility of a school certification;
- acquisition of competence;
- divertive effect from the condition of detention;
- personal growth;
- socialization and dialogue;
- the possibility of creating a connection with the outside world.

Finally, it is also emphasized that the purpose of the school in prison should be in line with the purpose of the

school outside the prison in order to ensure continuity in prisoners' educational and training: *"The organization of the [school] for which I worked, makes it possible to follow the student even in case of a change of measure or remission, ideally without interruptions of the course undertaken; this makes it possible to guarantee the fulfilment of training obligations [...]"*.

School-prison relationship

The relationship between penitentiary and school institutions appeared to be mainly problematic, with few positive aspects.

In the few cases where this theme appears as positive, it relates to the fact that in some situations, the possibility of cooperation between school and prison principals allowed the creation of opportunities for professional training and other educational projects for students. Moreover, the dialogue with the prison administration staff is presented as potentially fruitful for the definition of the individual pathways of the prison students themselves: *"[...] the meetings with the professional figures who gravitate around each student, are useful moments for the knowledge of their personal and educational pathway as well as moments of confrontation on the progress of the re-educational pathway of each prisoner"*. These aspects, however, seem to be limited to specific projects and to be strictly dependent on the specific context: *"Our headmaster has positive relationships with the headmasters of the [...] prisons, and this is a benefit when asking to be able to realize particular projects and paths or to introduce tools [...] inside the prisons"*.

At the same time, it is pointed out that the critical aspects highlighted concerning the school-prison relationship include:

- security regulations restricting the use of appropriate materials;
- logistical problems, such as interruptions and delays during lessons;
- lack of joint educational training between teaching staff and prison staff;
- conflict between the different goals and purposes of the institutions and their staff;
- lack of recognition of the work needed to coordinate the two realities;
- duration and organization of detention imposes a discontinuity in the students' school career.

Class group composition

The category related to the class group composition appears both in relation to critical aspects and positive aspects.

One aspect mentioned in many posts is the high turnover of students entering and leaving the prison during the school year. This appears as a challenge: *"High turnover of entries, transfers, and releases: partial or missing information on the educational path. The number of students in each class is constantly changing during the year [...]"*. On the other hand, this aspect is also seen as an opportunity to be prompted to personalize the educational path based on the students' competencies: *"The high turnover [...] allows for the development of lessons focused on the actual needs of the students within the limited time available"*.

Another ambivalent element is the significant heterogeneity of students from various aspects: language, age, cultural and educational background. This is considered mainly as a critical aspect: *"Imprisoned students may exhibit a wide range of literacy levels and skills, with some facing significant challenges in following the standard curriculum. This diversity necessitates special attention to meet the individual needs of the students."* However, in one post, the students' heterogeneity is seen as an opportunity: *"The opportunity to work effectively with multi-class groups of varying levels of proficiency in Italian, ages, and diverse cultures is certainly complex but constitutes a great wealth"*.

Despite the high turnover and heterogeneity, the small number of students in a class is considered as a positive element by all the teachers who mentioned it, as it allows for personalizing the educational path. On the contrary, an aspect that is considered a Threat by all those teachers who mention it, is related to the problematic socio-economic and cultural background of many of the incarcerated students: *"On average, young prisoners come from fragile socio-economic and family backgrounds, and have never owned or used a computer [...]"*. The psychological conditions of incarcerated students, sometimes precarious, are also mentioned among the problematic aspects: *"Among young prisoners, there has been a trend of increasing numbers of fragile individuals with psychiatric issues, related or unrelated to severe substance abuse"*.

Attitude toward the subject

The category “Attitude towards mathematics” is represented in teachers' posts highlighting negative and positive aspects. In particular, the positive post underlines the function of distraction from reality guaranteed to the prisoner by mathematical abstraction: “[...] *a mathematical question can momentarily distract them and keep this burden away for a while, respond to the need to take their head elsewhere*”. On the other hand, the negative posts highlight the fact that the low motivation of the students to study (mathematics in particular), is connected to their negative experiences with schooling: “*Many students have had negative experiences with school and in particular with mathematics*”.

The discussion during the online meeting highlighted that mathematics is seen as the “*subject for the gifted ones*”. This fact influences the internal factors related to the study of mathematics in two ways: on the one hand, previous negative experiences with schooling are more easily and intensely associated with the study of mathematics, provoking feelings of inadequacy and attitudes of rejection; on the other hand, students who manage to cope in mathematics, reveal a stronger intrinsic motivation. Such intrinsic motivation can be caused by:

- redeeming themselves from their previous unsuccessful course of study;
- taking advantage of the opportunity to study mathematics which they have always been passionate about;
- being stimulated by gratification and the desire to stand out from others.

This continuous discovery of mathematics by the students may lead them to feel increasingly more passionate and have a growing desire to continue studying mathematics, precisely because they feel gratified by their own discoveries.

In the teachers' words, a positive and constructive attitude is fostered when students are stimulated to discover mathematics through a collaborative approach. On the contrary, when the class group is not cohesive, it is not easy to trigger these virtuous processes and, moreover, the study of mathematics requires a cognitive effort that is not always compatible with the psychological condition of the students in prison. This incompatibility leads the student to have low motivation in the study of mathematics, accompanied also by a sense of inadequacy and frustration.

Assessment

Teachers address the category of assessment by highlighting both its positive and negative aspects.

With respect to the positive aspects, teachers point out that assessment in prison is rarely related to the idea of grading and, as a result, is less formal: “*The particular environment and conditions provide for a 'relaxed' system of testing moments. This allows one to experience the pros of learning unencumbered by the pressure of the grade as a judgment*”. However, in their posts, teachers point out the fact that formative assessment, certification of skills, and graduation are hindered by the high turnover of students in classes, indeed “*There is a risk of not being able to certify even part of the skills possessed or acquired by the student; the student's school career is very fragmented*”.

Relationship with the local community

The category related to the “Relationship with the local community” has been addressed mainly highlighting its positive aspects. However, it was also accompanied by critical aspects.

The first critical aspect is the frequent absence of specific cultural mediators; the support offered by associations and territorial administrations to the school in prison is not always sufficient for the students' education: “[...] *No cultural mediators are available as an additional resource or to assist the teacher, not even occasionally*”.

At the same time, another critical aspect is linked, in some cases, to the activities carried out by prisoners with voluntary associations, cooperatives, and enterprises. They can be carried out during the same time and in the same spaces provided for the school organization: “*Unfortunately, school comes last among the important things and schools are given limited time and often inadequate space. Voluntary associations often have the same time and space as schools*”.

On the other hand, teachers stated that, in many cases, the contribution coming from the collaboration with other institutional organizations outside the prison turns out to be a resource in the personalization

of the learning programs of students and in the perspective of the development of lifelong learning: *“It was possible to conclude agreements with schools, training organizations, and the Municipality of Milan for [...] structuring personalized plans for the students involved to encourage attendance and the development of specific and transversal, formal, informal, and non-formal skills”*. Furthermore: *“The educational offer could be expanded by allowing and encouraging the entry of external experts who offer their availability also free of charge. The intervention of these experts could also be extended to prisoners who do not attend school [...]”*.

Personalization

The category concerning the personalization is mainly related to positive aspects, with only one exception. The criticality concerns the need for a specific educational attention to address the individual needs, and it is linked with the difficulty of following the standard curriculum in the prison context. As regards strengths and opportunities, the personalization is favoured by the small number of students per class and the flexibility with respect to the standard curriculum.

The strengths mainly refer to the possibility of considering the competencies that students have and grasping their real learning needs: *“The didactical activities are based on the personalization of the re-educational path of each student [...] they leverage the development of the individual potential and competencies [...], and take into account expressed and unexpressed interests and needs”*.

Other forms to pursue personalization concern the certification of the learning outcomes, and the organization of lifelong learning paths through distance learning after the end of the detention: *“The organization [...] allows to follow the student also if there is a change of measure or a release, ideally without interruption of the learning path”*.

Other

Some of the topics in the teachers' voices remain outside of the identified categories. Some topics are mentioned in a few posts (less than 3), while others are not very explicit and are difficult to separate from other topics. Although they do not meet the requirements to constitute a separate category, we present them in this section for completeness.

Some posts highlight the human dimension found in prison: one teacher values the relationships of trust and collaboration that are established between teachers and students, and others describe how the educational journey contributes to the redefinition of the self.

There is only one explicit reference to teacher training: a wish for common training with prison employees with the aim of sharing of values and goals. This post received large approval by other teachers.

On three occasions, the inadequacy of outdated and unattractive textbooks is highlighted. This theme is connected to the category "Equipment". However, it has a different connotation, as it depends on economic and cultural dynamics outside the context: *“Maths books for [adult education] are often very simplified and uninteresting. For obvious reasons, publishers do not invest in such an unprofitable market segment as [adult education]”*.

Many teachers' post report problems that may be traced back to poor organization of time and space within the prison, but the theme is not clearly expressed. These factors seem to influence time management and educational planning greatly. However, in the formulations developed by teachers, this theme is nuanced, and its causes are not explicit: *“Sometimes the organization of the timetable makes it difficult to conduct classes”* and *“For most prisoners, classes take place in common classrooms that must be reached from the various prison sections. These movements often take place slowly or with difficulties related to permits and security”*.

To further clarify and contextualize these findings, Table 2 presents a synthetic description of each category, indicating its origin (whether theory- or data-driven), summarizing the main positive and negative aspects highlighted by the teachers. These quotes give voice to participants' perspectives and help exemplify how each theme was expressed in practice. Together, the two tables (Table 1 and 2) offer a concise yet grounded view of the complexity of teaching mathematics in prison settings.

Table 2*Summary of Categories*

Category	Type	Positive Aspects	Negative Aspects
Motivation to study	Theory-driven	Personal growth, reintegration, socialization, distraction from reality	Demotivation due to past failures, low schooling, negative math experiences
Equipment	Theory-driven	Availability of photocopiers, and PCs in some schools	Lack of materials, chalk-only classrooms
Classrooms	Theory-driven	Bright, spacious classrooms in some prison branches	Dirty, cramped, inadequate classrooms
Curriculum	Theory-driven	Flexible curriculum, adapted to context and students' needs	Fragmented paths, lack of coherence
Role of prison education	Theory-driven	Certification, growth, re-socialization, right to education	Not always recognized or supported by prison staff
School-prison relationship	Theory-driven	Opportunities for collaboration	Misalignment of goals, institutional tensions
Class-group composition	Data-driven	Diversity as richness, small groups help personalization	High turnover, unstable classes
Attitude toward mathematics	Data-driven	Rediscovery of motivation, mental escape	Math anxiety, low self-efficacy
Assessment	Data-driven	Informal, formative, adapted to the learner	Difficulty in certification, inconsistent records
Relationship with local community	Data-driven	Support from volunteers, third-sector partnerships	Overlap and lack of coordination
Personalization	Data-driven	Tailored teaching, continuity, re-entry preparation	Hard to implement due to time and group constraints

Discussion and Conclusion

In this contribution, we created a preliminary but overall picture of schooling in Italian prisons considering teachers' reflections regarding their experiences in teaching mathematics in this peculiar context. Thus, to address the gap in current literature on this issue, this study investigated the question: Which is the Italian mathematics prison teachers' perspective about the context in which they work?

We considered the reflections provided by a group of nine mathematics teachers who teach in different prison contexts in Italy and have different experiences and backgrounds. Their reflection allowed us to deepen issues raised in the literature review (reflections related to the 6 theory-driven categories) and identify new issues that emerged directly from teachers' voices (reflections related to the 5 data-driven categories).

As expected, the prison context is characterized by a high complexity level and the issue of teaching mathematics is multifaced and it is also influenced by the peculiarities of a specific context or a specific time. This complexity led teachers to refer to the same category considering both positive and negative aspects of the same issue. A paradigmatic example of this fact is the analysis of the category "Class Group Composition": this category stimulated several teachers' reflections highlighting eight times Weaknesses and Threats and seven times Strengths and Opportunities. Indeed, class composition in prison schools is characterized by a high turnover of students and a significant heterogeneity in terms of language, age, cultural and educational background (Byrne & Carr, 2015); these peculiarities constitute a challenge that teachers need to face to design educational activities, but also an opportunity that led them to a more personalized approach.

In some cases, teachers' reflections on some issues are predominantly negative, which allowed us to highlight specific criticalness related to teaching in the prison context. These negative aspects are often related to practical issues as, for instance, in the categories "Classrooms" and "Equipment" teachers denounced the inadequacy of classrooms and materials devoted to school activities. In other terms, there is a lack in the available resources (see Adler, 2000).

Furthermore, teachers highlighted mostly positive aspects in relation to some categories. For instance, the "Curriculum" and the "Personalization" categories are strictly interconnected and, in both these categories, several positive reflections emerged in relation to the necessary flexibility of prison teaching processes, which is possible thanks to the small number of students per class. This flexibility is seen by teachers as an Opportunity and a Strength that allows them to propose diverse didactical activities and to design personalized learning paths considering students' previous competencies and experiences and their learning needs, in the perspective of a lifelong learning outside the prison context (Schlöglmann, 2006).

In this contribution we reported an analysis of teachers' perspectives in relation to the eleven categories identified, providing an analysis of each category separately. Despite this, several interesting connections emerged between categories and it would be interesting to deepen, in further studies and based on a wider sample, which are the relationships between these categories. For example, it would be interesting to better understand how teachers perceive the mutual influence between students' "Motivation to study" and their "Attitudes toward the subject" since the relationship between these variables is well known in the literature (e.g. Zan & Di Martino, 2007). Moreover, this contribution confirmed that teaching mathematics in prison is a multifaced and complex issue, which varies from school to school, from class to class and from student to student. Teachers have a crucial role in ensuring the participation of all students, they need to face daily challenges due to practical, theoretical, and political issues and they must be supported in promoting flexible, personalized, and significant educational activities. In this paper we report a preliminary study considering the voices of a few mathematics teachers teaching in different school prisons. Further studies including more teachers are needed to understand if the reflections that emerged are confirmed or need to be expanded because of different experiences and contexts. Comparison and contrasts of similar studies (in the forms of multiple case studies and meta-analysis) in different contexts – including other countries – may serve to provide more robustness to these results. Sharing our analysis, we hope to move the first step in this direction. Moreover, in-depth interviews with teachers and observations of their lessons will allow us to better understand the teaching processes they adopt to face the challenges emerged from their voices. In the following phases of the LeMP project our purpose is to identify, thanks to the collaboration between researchers and teachers, design principles and examples of applying these principles in various mathematics learning units tested in different prison contexts.

Funding

This work has been funded by the European Union - NextGenerationEU under the National Recovery and Resilience Plan (PNRR) - Mission 4 Education and research - Component 2 From research to business - Investment 1.1 Notice Prin 2022 - DD N. 104 del 2/2/2022, project "Learning Math in Prison", proposal code 20223F9SRE – CUP J53D23011150001.

Declaration of Conflicting Interests

The authors declared no conflicts of interest regarding the research, authorship, and/or publication of this article.

Acknowledgements

The authors wish to thank all the teachers who collaborated in the research project. Their contribution has been essential. Furthermore, the authors wish to thank all the other researchers involved in the LeMP project since many of the ideas presented in this contribution have been elaborated within shared reflections.

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