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PROCEEDINGS

02

Cultures, Practices, and Change

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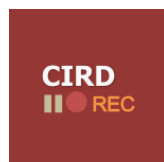
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Vol. 2

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Organizers and partners



TRIGGERING A VIRTUOUS CYCLE: ENHANCING ARGUMENTATIVE ABILITIES IN SFP STUDENTS TO ENHANCE THEIR ACADEMIC SUCCESS AND PROFESSIONAL DEVELOPMENT

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In the face of the low levels of linguistic and mathematical literacy in students enrolling to Scienze della Formazione Primaria (SFP, the Italian degree training and qualifying perspective pre- and primary school teachers), we elaborated activities and teaching strategies aimed at supporting the development of basic math and language skills in these students, including argumentative skills. The article presents a programme developed during academic year 2023-24 in the framework of remedial activities organised for first-year SFP students with additional learning requirements (OFAs). The aim is to contribute to the discussion on possible strategies to reduce school (and university) dropout and guarantee academic success for a larger number of students. These activities were focused on basic grammar, text comprehension, arithmetic, algebra and argumentation. Argumentation has been given relevance, not only because knowing how to argue and being able to understand and assess argumentation is necessary for daily life activities and is essential for a successful university career, but also because SFP students will have to teach it to their pupils. The paper presents preliminary data collected during these remedial programmes, focusing on the activities proposed, the results obtained and the participants' opinions.

argumentation; preservice teacher education; university dropouts; transdisciplinary skills

INTRODUCTION

Being able to argue, to understand our interlocutors' argumentations and to assess whether a statement, opinion or demonstration is sound, is necessary for many daily life activities and is particularly important for a successful university career. The Italian school curriculum gives great attention to the development of argumentation skills in all school cycles, starting from preschool through to secondary school. However, despite this attention, various data on university students' (in)abilities highlight unexpected difficulties in producing and understanding argumentative texts.

Argumentation abilities are doubly important for students in Scienze della Formazione Primaria (SFP), since they study to become preschool and primary school teachers and need these abilities not only to proceed successfully in their academic career, but also to be able to foster these skills development in pupils when they become teachers (Dunst et al. 2020).

As members of a university department involved in the education and training of SFP students, we have decided to tackle the issue of argumentation in the framework of a department research, with the intent on the one side, at supporting the development of argumentative skills in SFP students and, on the other side, at providing tools for the development of argumentative processes in present university students and their future pupils. The approach is transdisciplinary, ensuring a plurality of viewpoints thanks to the presence in the team of researchers in linguistics, mathematics education and teaching methodologies.

This paper focuses on the tackling of educational poverty and on possible strategies to reduce school (and university) dropout, to guarantee academic success for a larger number of students and improve preservice teacher training. The data presented are part of this research and have been collected during last academic year (2023-24) in the framework of remedial activities organised for SFP first-year students with additional learning requirements (OFAs).

1. WHO ARE OFA SFP STUDENTS?

Before admission to Italian universities all students have to be tested in order to verify that they have no deficiencies in basic knowledge which might condition their success in the chosen degree. The students who present these deficiencies can enroll, but are assigned OFAs.

In the SFP degree of the University of Modena and Reggio Emilia students with OFAs are identified on the basis of their performance in the admission national test. For 2023-24, this test comprised multiple-choice questions across three domains: 40 questions in language and logical reasoning, 20 in mathematics and sciences, and 20 in humanities. Students who failed to answer correctly at least 30 of the questions in language and logical reasoning and/or 13 of those in mathematics and sciences were attributed OFAs in both/either domains. OFA consisted in compulsory attendance of classes and a final exam. The classes took place in the first semester, for a total of 10 weeks, with 4 to 6 hours of on-site or on-line lessons a week for each domain.

In the academic year 2023-24, out of a total of 250 students admitted, 145 scored below threshold. Of those students, given that 63 had exemptions, 82 were assigned OFAs: 36 only in the language domain (OFA 1), 22 only in mathematics (OFA 2), and 24 in both.

These students had attended different types of secondary schools, with the highest percentage specializing in humanities: approximately 43% attended humanities schools, 19% technical schools, 15% scientific schools, 12% linguistic schools, and 10% other types of schools. They can be considered average students

according to high school exit assessments as their median final grade corresponds to [80–89], where passing grades range [60-100].

2. INITIAL ASSESSMENT

For both language and mathematical domains, on the first day of classes the students were offered a further test designed by the research team to better focus the difficulties, design the activities, and prepare an individualised program of attendance for each student, based on their real needs.

Remedial activities included mandatory classes for students with lower testing scores and online classes and exercises for students with higher testing scores.

Throughout the course records were kept of class participation, number of exercises completed, homework accuracy, and quality and complexity of written argumentation

3. ACTIVITIES PROPOSED

The grammar activities (3 lessons and 3 exercise sessions, 12 hours) were focused on a) the identification and characteristics of the 9 Italian parts of speech with a special focus on verb forms, b) the identification of syntactic subject, c) the distinction between simple and complex sentences.

The activities on text comprehension (8 lessons including exercise sessions, 16 hours) concerned basic information on how to approach a text through questioning, clarifying, summarizing and predicting and included comprehension exercises in pair or small groups, applying text-centred strategies, the analysis of a visual text, homework that could be sent to the lecturer in order to have feedback (Cardarello et al., 2020).

The algebra activities (7 lessons including exercise sessions, 14 hours) concerned basic knowledge on a) operations with monomials and polynomials, b) formulating equations, c) solving equations, d) reading formulas, e) inverse formulas, and included exercises and problem-solving activities.

The arithmetic activities (6 lessons including exercise sessions, 12 hours) concerned basic knowledge on a) number sets, b) operations, c) arithmetic expressions, d) prime factorization, e) multiples and divisors of natural numbers, f) fractions, g) percentages, h) direct and inverse proportionality, g) powers and their properties, with exercises and problem-solving activities, to be done individually and in small groups.

As already mentioned, argumentation was considered a crucial part of our remedial activities, for both language and mathematical domains, and was approached combining the perspectives of linguistics and mathematics education with the intent of highlighting for the students the common core of argumentation skills regardless of the topic and scope. On the basis of the data collected in the initial subtest and in previous investigations (Bianchi, Favilla, Maschietto 2022), the team identified as key weaknesses:

1. A tendency to describe rather than argue.
2. A lack of awareness of the need to support claims with data and to make the general rule explicit.
3. Data or general rule, if given, often not relevant for the claim.
4. Scarce use of linguistic indicators of argumentation, both in oral and written productions.

For this reason, the remedial activities on argumentation (18 hours of on-site and on-line lessons) were tailored to a) define argumentation and identify the various elements of an argument; b) present two exemplificative argumentation models (Toulmin model and V-diagram); c) present connections with mathematical argumentation (Douek, 2007); d) analyse and practice the possible uses of connectives; e) present the set theory to support argumentation modelling.

The key theoretical model adopted is based on a re-adaptation by Lo Cascio (1991, 2009) of Toulmin's model (Toulmin, 2003, proposed for the first time in 1958). This model allows to formalize argumentation and its constituent components, characterizing it also from a linguistic point of view, in an attempt of theorization and categorization. It helps to identify the central components of the argumentative discourse: claim, data, warrant. It also identifies the accessory parts: qualifier, backing, rebuttal. The model helps students focus on key argumentation elements, thus articulating more robust argumentation, but also identifying the faultiness of arguments presented to them.

The V-diagram supports visualization of arguments and counterarguments allowing for argumentation styles that take other points of view into account. Using the V-diagram visualisation non-scientific argumentation can be presented through negotiation among different points of view, facilitating a more nuanced and critical vision of reality (Nussbaum et al., 2011).

5. COMPARISON BETWEEN INITIAL AND FINAL ASSESSMENTS

On the last day of classes, the students were offered a test similar to the initial one. The students who did both tests were: 52 for the OFA1 test on grammar, text comprehension; 36 for the OFA2 test on algebra, arithmetic; 72 for the argumentation part of the test (which was the same for both OFA1 and OFA2, so that the students who had both were tested on it only once).

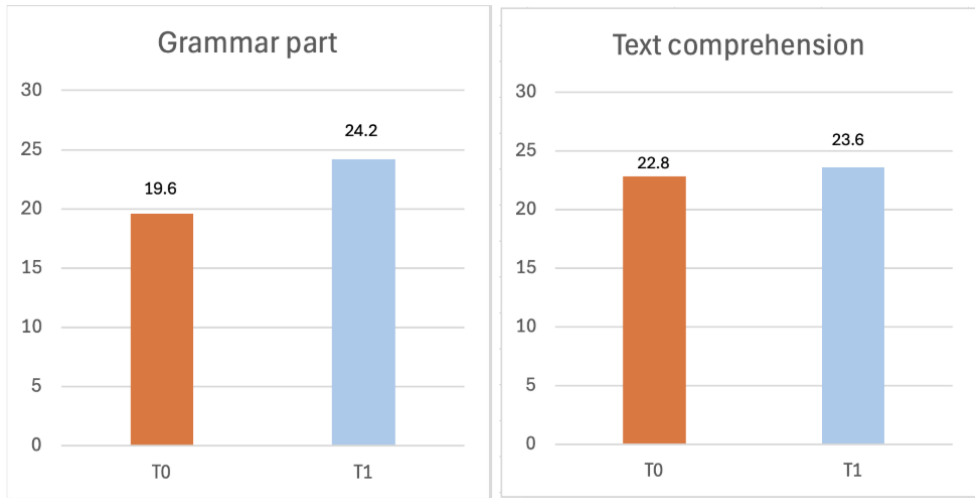
The comparison between initial (T0) and final test (T1) gives indications on the efficacy of the activities.

In the language domain (Fig. 1), for the grammar part, T0 and T1 required an analysis of 4 sentences aimed at identifying the various grammatical elements discussed during the activities. The answers given by the students in T1 show an improvement (average score: 19.6 out of 30 at T0, 24.2 out of 30 at T1).

As for text comprehension, the students had to read two short passages and answer multiple choice questions aimed at assessing the abilities to understand and connect information, as well as to infer implied meanings. The comparison between

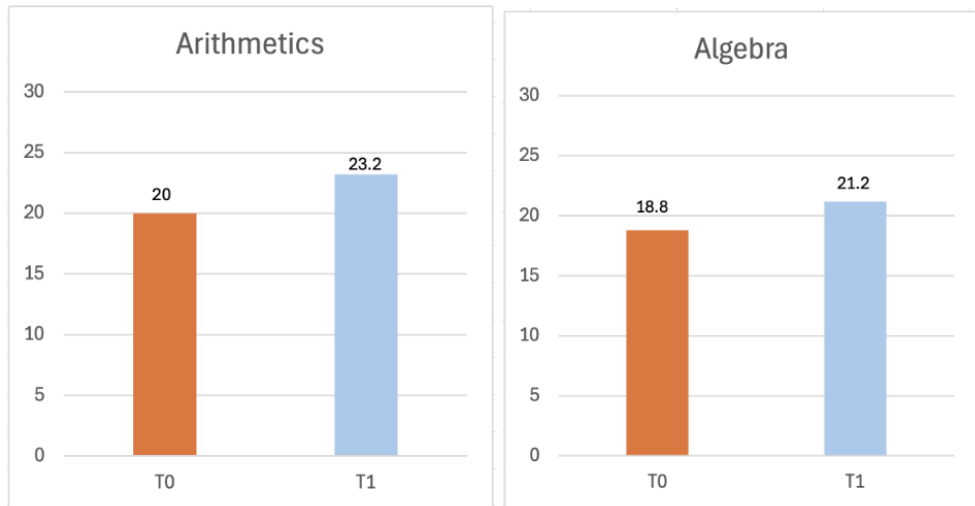
initial and final tests shows no remarkable improvement (average score: 22.8 out of 30 at T0, 23.6 out of 30 at T1).

Fig. 1. Comparison between T0 and T1 in the language domain.



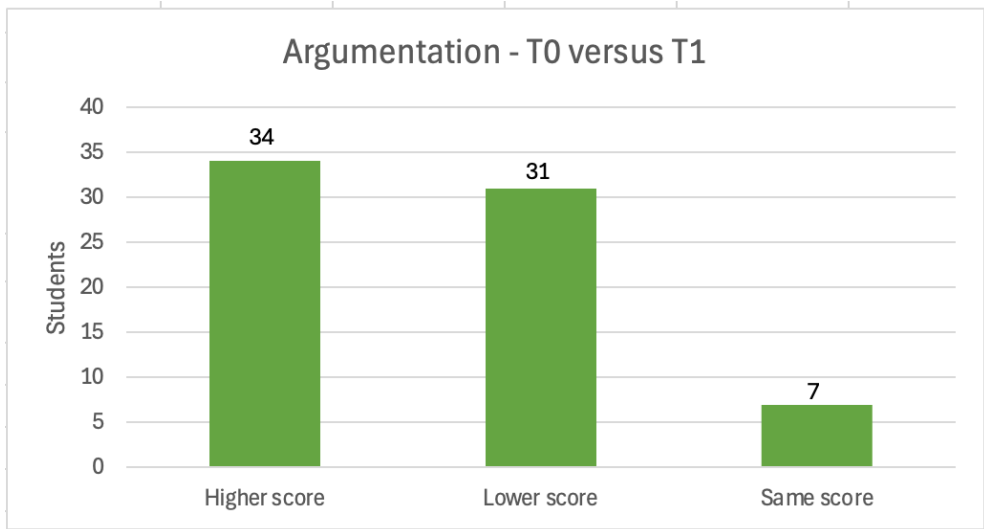
As for mathematics (Fig. 2), the test required solving arithmetic and algebra exercises similar to those proposed during the activities. In both cases, the results show an improvement (for arithmetic, average score: 20 out of 30 at T0, 23.2 out of 30 at T1; for algebra, average score: 18.8 out of 30 at T0, 21.9 out of 30 at T1).

Fig. 2. Comparison between T0 and T1 in the mathematical domain



With reference to argumentation (Fig. 3), a first sight comparison between T0 and T1 does not show encouraging results, since out of 72 students, an improvement has emerged only for 34, while 31 have worsened their results and 7 have remained the same. However, among the 34 students who had better results at T1, 31 had participated actively in the classes and 30 had handed in their homework regularly to have feedback on it. On the contrary, among the 31 students who had worse results at T1, only 2 had participated actively in the classes and 4 had handed in their homework regularly.

Fig. 3. Comparison between T0 and T1 in argumentation



The final test on argumentation included also some specific topics that had not been tested in the initial assessment, but which have been the object of discussions and activities during the course. These topics concerned Toulmin’s model, the V-diagram, mathematical argumentation, and set theory. With reference to these topics, set theory emerges as the most difficult, with an average score in the final test was 1.31 out of 3, followed by the V-diagram, with an average score of 1.81 out of 3, while exercises on Toulmin’s model and on mathematical argumentation have obtained quite good scores, with an average score of respectively 2.19 and 2.02 out of a maximum of 3.

4. STUDENTS’ OPINIONS

In addition to comparing the results of T0 and T1, at the end of the activities we have tried to collect data on the students’ attitude and level of satisfaction, through a specific question in the final test (“Was it fair and useful to force OFAs remedial activities on students?”) as well as through informal conversations and a final focus group. Some examples of the opinions collected can be found in Figure 4.

Fig. 4. Examples of the opinions collected

1. Although many people find OFAs unnecessary and see them as a waste of time, it must be recognized that in order to succeed in certain new subjects and disciplines, it is important that prerequisites are established.
2. Despite students’ disapproval OFAs courses are useful for the preparation of students who, without them would not be able to stand the exams.
3. I myself am thankful that I finally understood some basic rules that should be learned in elementary school.
4. Starting a university course, many of the students are not aware that they have knowledge deficits in several areas.
5. We cannot imagine that what is to be taught is not known by those who must first lead in the process of this discovery.
6. Making all OFas remedial activities compulsory would be a way to improve it. Attending each class involves a great effort, but one that is necessary to gain a complete acquisition of the competencies that are useful for our future work.
7. The OFAs remedial activities are very helpful, but it would be appropriate to broaden the audience to include students with a bachelor’s degree as well.
8. OFAs activities enabled students to make connections with other students with the same difficulties.
9. I particularly appreciated the “informality” used with students, which made it easier for many to start university.

The information collected shows that most attending students recognized the need to recover the skills they were lacking, the adequacy of the course in helping them to do it, and the crucial importance of the core skills proposed in the course for their university studies (e.g. 1-4 in Fig. 4).

Also, the connection between those skills and the teaching profession emerged clearly from students' comments (e.g. 5, 6 in Fig. 4).

It should be noted, however, that only a small part of the students took part in the focus group and that also the answers given in the test might be conditioned by the desire to get good results.

CONCLUSION

Even if further data and more detailed analyses are necessary, our data on remedial activities allow some first general conclusions.

Many students arrive at SFP with unexpected difficulties in language, mathematical and logical domains.

One important problem is making the students aware of the importance of remedial activities, both for their academic success and for their future teaching profession. Even if some recognised the usefulness of the course, some of them felt unduly obliged to attend the remedial activities and did not understand the purpose of working on argumentation. This resulted in lack of motivation and scarce participation in the activities, which in turn did not allow them to gain from the course.

As for actively participating students, ten weeks of activities have proven enough for recovering from their previous studies or gaining basic grammar knowledge and basic argumentative skills, while for other skills, such as text comprehension, the results have highlighted the need for a longer period for real improvement. It is also on the basis of these results that for academic year 2024-25 the OFA course has been planned as a one-year course, with an average of one class per week and online group activities during semester pause.

With specific reference to argumentation, the comparison between T0 and T1 has clearly highlighted the importance of motivation and active participation in order to have positive results. Moreover, the fact that the best results have been obtained in mathematical argumentation and the Toulmin model suggests that difficulties are greater with symbolic representation and non-dichotomous argumentation, maybe because students are not familiar with these representations and few weeks are not enough to learn them.

One final consideration should be made about the overlapping and common aspects between the linguistic and mathematical approach to argumentation, which the students find difficult to perceive and accept, probably because of their being used to too narrow boundaries between school disciplines.

The next stages of our research will be devoted to providing further and stronger data to demonstrate the importance of including argumentation, dealt with in a common linguistic and mathematical approach, among the activities aimed at

improving basic language and mathematical skills in order to guarantee academic success for a larger number of students.

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