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Persone, Educazione e Welfare nella società
5.0

Community Notebook

People, Education, and Welfare
in society 5.0

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TEACHING ENHANCED LEARNING FOR ENGAGING
AND INCLUSIVE LEARNING

Edited by
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3. HOW CAN A SOFTWARE INNOVATE LATIN TEACHING

by Luca Cortinovis*, Francesco Stabile**

Introduction

The digital revolution that has been impacting society for over a decade and is profoundly changing the world of work and professions has, so far, only touched upon the Italian school system. There are several reasons for this: from a certain resistance among a portion of the teaching staff to embrace new technologies, to the mindset of the school publishing market still centered around printed textbooks, with digital tools often serving only as supplements. Additionally, there is a lack of interested (and equipped) actors in the market for a digital revolution in education. Even the experience of the pandemic does not seem to have accelerated the process.

So far, two paths have been taken. On one hand, there is the path of management software (such as Google Classroom), which is useful for managing the working environment but lacks educational content, leaving its preparation to the teacher. On the other hand, attempts have been made to enhance printed textbooks with a digital version that replicates the format and modes of consumption, lacking a management aspect and not fully

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utilizing the potential offered by digital tools, while also paying little attention to the user experience.

The history of books demonstrates how the evolution of formats has changed both the organization of content and its consumption. The challenge posed by the digital revolution requires a profound reconsideration of the educational offerings to support teachers in their essential profession.

The widespread use of digital devices has created a demand for effective digital tools applied to education, which has not yet received an adequate response.

The Experience of Aeneas

Innovating Latin language teaching without trivializing the content, without replicating the printed book, and above all, without presuming to replace the essential work of the teacher is the challenge embraced by the software Aeneas.

The history of books teaches us how, with the transition from an old format to a new one - from scrolls to codices in late Antiquity, from handwritten manuscripts to printed books in the late 15th century, to the advent of digital technology in our present day - the organization and consumption of content have also evolved.

The application of computer science to education often fails to properly consider the relationship between teacher and students, as well as the immediacy of access, a fundamental characteristic of any digital product.

Designing a digital tool that integrates every aspect of teaching - from traditional lectures to hands-on activities, to homework - should not aim to replicate a printed book by simply focusing on the ability to vastly increase the amount of content

and exercises. Applying digital technology to education requires, first and foremost, a radical reorganization of the discipline, along with a clear awareness of the limitations and potential of digital tools. Aeneas harnesses the power of computation to support students in the mechanical aspects of learning Latin grammar (declensions and conjugations), increasing the volume of exercises – potentially infinite, as they are algorithmically generated – and reducing the effort required to complete them. It also utilizes the potential of interactive graphics to visually represent the structure of propositions and sentences on the screen, aiding in the comprehension of syntax and translation.

The teaching profession is slowly and haphazardly adapting to new technologies. On one hand, there is a growing recognition of the need for educational tools that radically change the methods of learning; on the other hand, however, there is a certain resistance among teachers to integrate innovative tools into their teaching approach, perceiving them as complex and often inadequate.

From another perspective, it is important to note the continuous increase¹ in cases of Special Educational Needs and Specific Learning Disorders. The use of computer-based tools is becoming increasingly necessary, not only as a modern supplement to textbooks but as a foundational element of teaching in every subject.

Aeneas has been designed to be a standard that can be replicated with other grammars, particularly those with complex morphology such as Italian or Ancient Greek.

¹ <https://www.istat.it/it/files//2022/12/Alunni-con-disabilita-AS-2021-2022.pdf>.

Since 2014, we have initiated a project for a software that could address certain needs in grammar teaching, entirely autonomous and self-funded.

With the aim of creating software that could adapt to any approach and teaching path, the work was divided into stages necessary to achieve the objective of Latin teaching: translation. The stages include:

1. Learning and recognizing morphology².
2. Transforming the inflected form into the lemma and searching the dictionary.
3. Recognizing first-level phrases and other elements that make up the proposition.
4. Relating phrases and other elements and identifying their types.
5. Identifying propositions.
6. Relating propositions and identifying their types.
7. Translation.

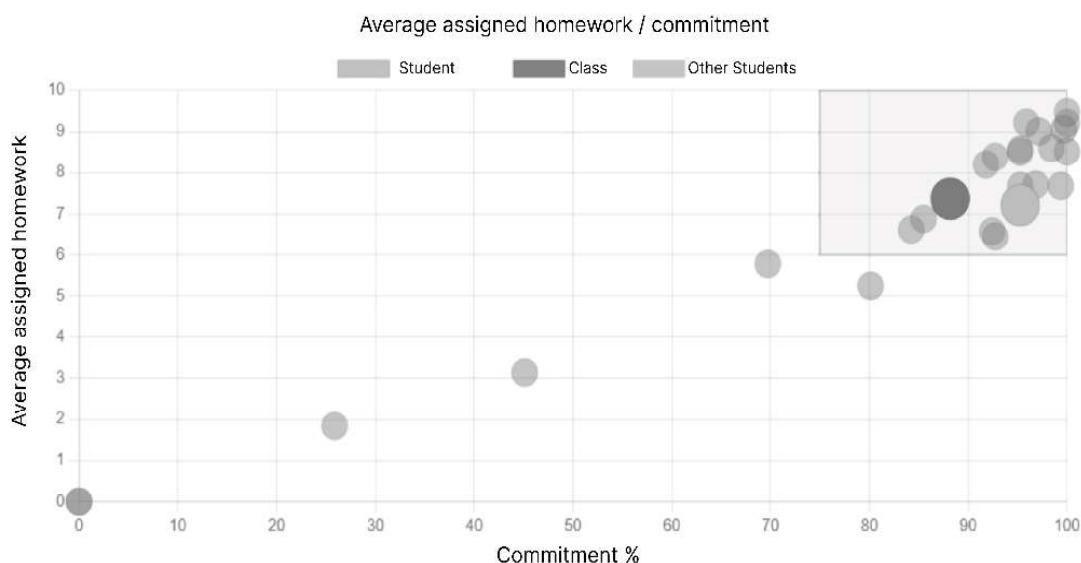
Points 1 and 2 are addressed in the morphology section. Morphological learning is one of the initial obstacles in studying a language with extensive and complex morphology, such as Latin, Ancient Greek, or Italian. With a database of approximately 400,000 inflected forms, covering around 4,500 commonly used words in grammar, and a selection menu, Aeneas is capable of providing and correcting infinite exercises on the analysis and insertion of inflected forms and the identification of lemmas, covering the entire Latin morphology. The objective is to develop in the learner the necessary automatisms for morphological recognition and dictionary search. This is a mechanical activity

² As specified in the specific objectives for learning the Latin language in Annex C and following of Ministerial Decree 211 of 2010.

easily managed by the software, which generates a significant amount of work. Due to careful attention to user experience, it proves enjoyable for the learner. The management system allows for exercise assignments and real-time monitoring of class effort and performance.

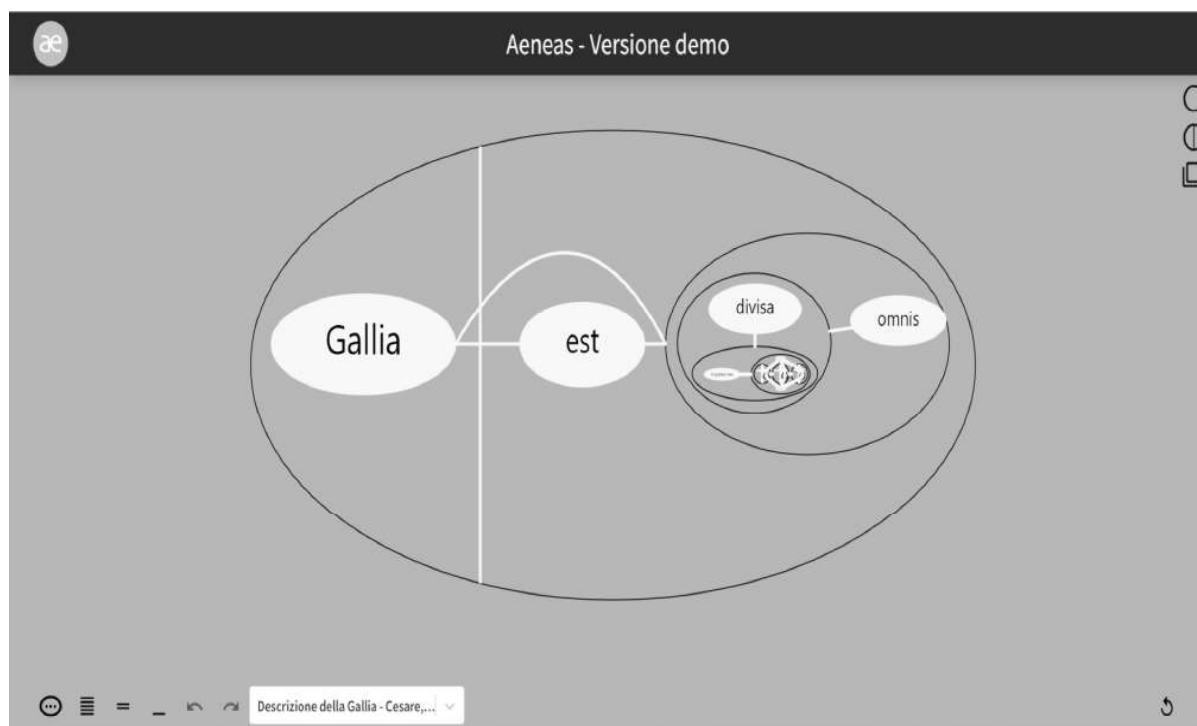
As an example, let's consider the 1ASU class of the 2021-2022 school year at the Luigi Einaudi Institute in Dalmine (BG), consisting of 23 students. From November 2021 to September 2022, they practiced with 80,630 words (out of an assigned total of 94,160 words), averaging about 3,500 words per student. It would be impossible for a teacher to prepare and correct such a workload. Assuming each word requires 10 to 20 seconds of manual preparation and correction, the workload would range from 250 to 500 hours. The performance has been very positive, as shown in Figure 1.

Fig. 1: Graph of performance for a student in class 1ASU of the 2021-2022 school year at ISIS Einaudi in Dalmine (BG). The green rectangle represents the area of those who completed at least 75% of the exercises (X-axis) with an average score of at least 6 out of 10 (Y-axis)



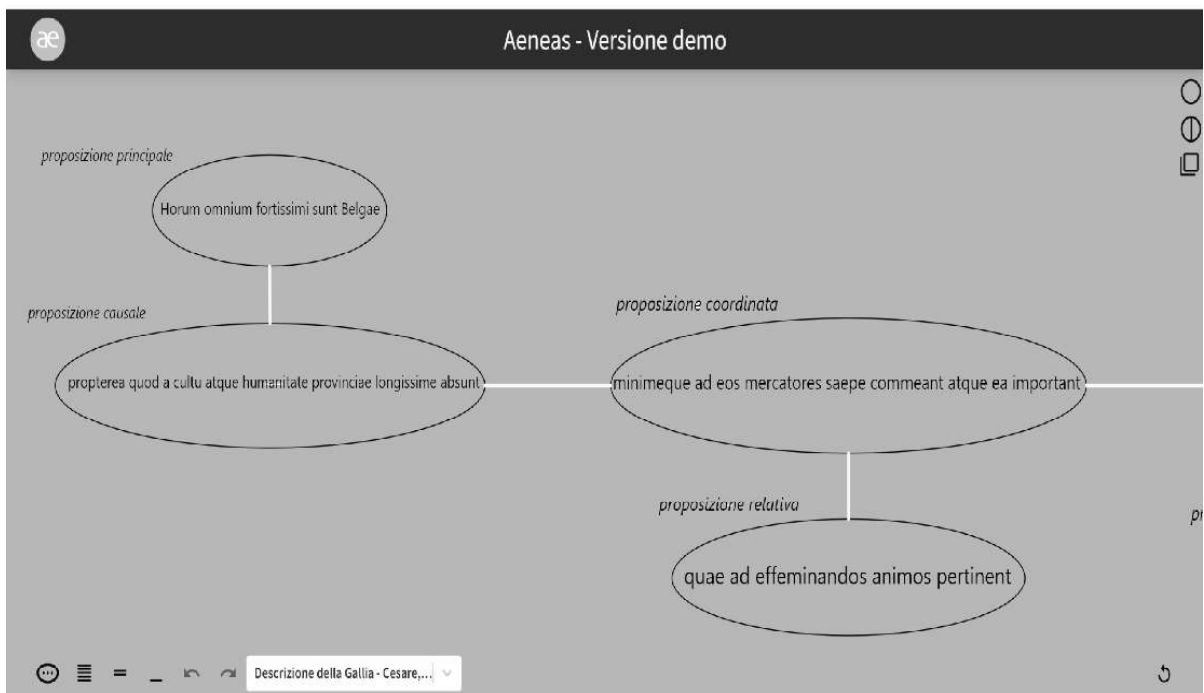
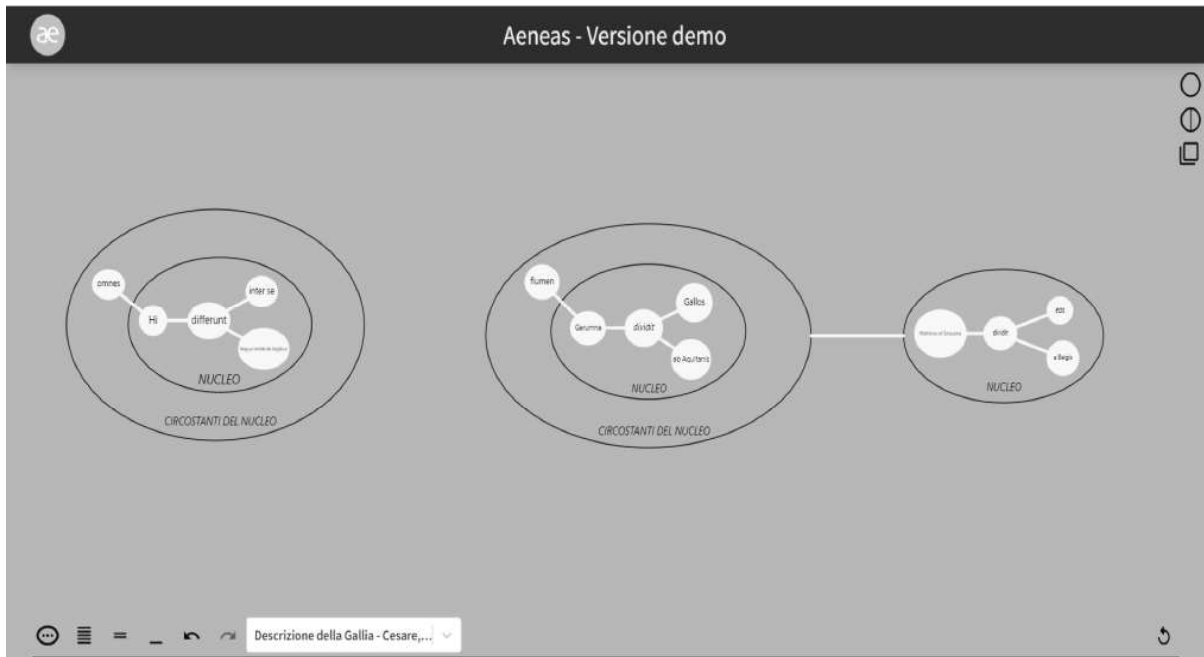
Points 3-7 were addressed in the section dedicated to syntax. Aeneas provides a digital whiteboard called the Syntax Whiteboard, which is an easy-to-use tool for graphical representation of propositions and sentences, to be used in the classroom or for homework. As there is no consensus on how to graphically represent syntactic structures, the aim was to provide a tool that can adapt to different approaches, from valency-based approaches³ already used in certain contexts, to generative approaches⁴, while allowing teachers the freedom to use the whiteboard in a personalized and flexible manner (see Figures 2-5).

Figures 2-5: Four possible approaches for using Aeneas's Syntax Whiteboard



³ F. Sabatini C. Camodeca, "Grammatica Valenziale e tipi di testo," Carocci 2022, and L. Tesnière, "Elementi di Sintassi Strutturale," edited by G. Proverbio and A. Trocini Cerrina, Rosenberg & Sellier, Torino 2001.

⁴ N. Chomsky, Syntactic Structures (2nd edition), De Gruyter Mouton 2002 (1st ed. 1957).





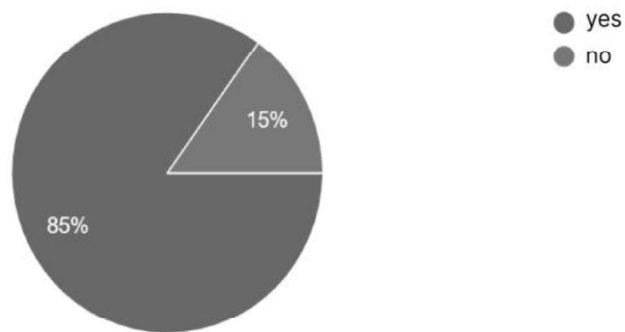
Conclusion

After two years of free experimentation, Aeneas has been on the market since the 2021-2022 academic year and is currently being adopted by 5 schools. Due to its nature as an independent and self-funded project, it currently has the ability to reach only a very small portion of the market. Teachers who have used it became aware of it through direct contacts with the development team. The response from students, including those who had previously used other digital tools for Latin teaching, has been very positive, further encouraging the research and development of the project (see figg. 6-7).

Figures 6-7: Two questions from the satisfaction questionnaire administered to students at the end of the 2021-2022 school year

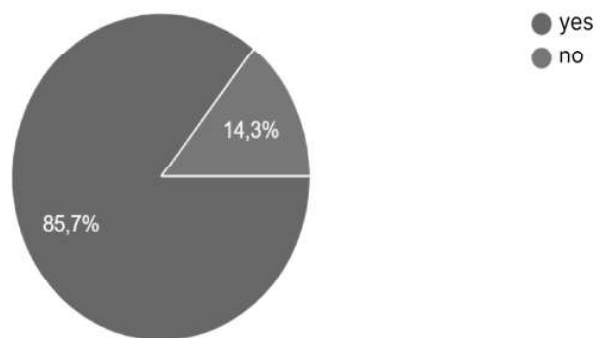
Do you think that using AENEAS helped you in better understanding latin language and in your school performance?

113 answers



Would you like to continue using AENEAS?

112 answers



At the end of each school year, a questionnaire is administered to all students aimed at verifying not only the user experience but also ensuring that the approach is the most suitable

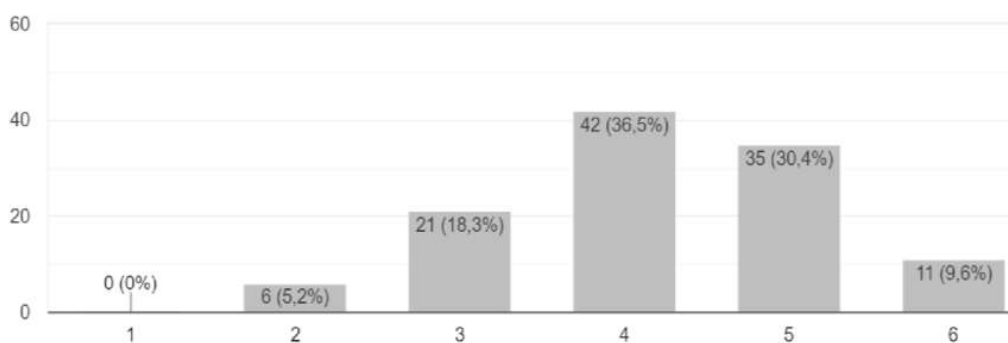
for addressing an audience like the one that Aeneas is currently targeting.

From the satisfaction survey, it emerged that not only do teachers appreciate and find effective the approach with which AENEAS supports their teaching (Fig. 8).

Figure 8

Do you consider AENEAS's approach to latin language effective?

115 answers

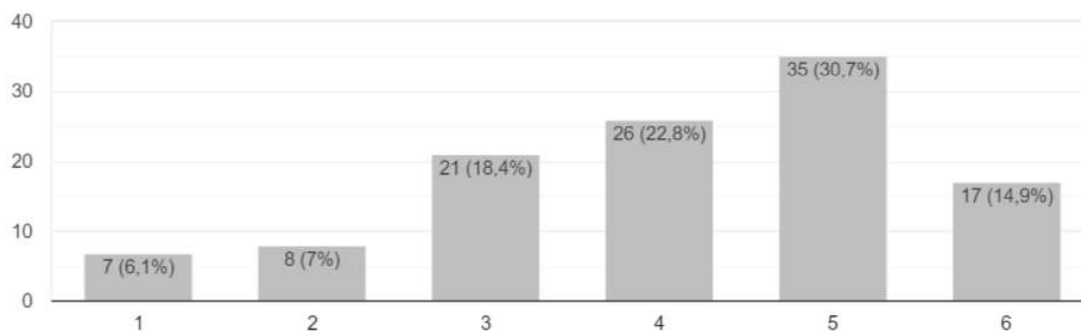


Furthermore, students suggest that a similar teaching approach would be interesting if applied to other subjects (Fig. 9).

Figure 9

Would you like to see the same approach to other subjects?

114 answers



Currently, our students attend first and second year classes in scientific, humanities, and linguistic high schools.

The creators are open to collaboration with institutions, schools, universities, publishing houses, and anyone who may be interested.

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