

Article

A Latin Functionalist Dictionary as a Self-Learning Language Device: Previous Experiences to Digitalization

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Academic Editors: Ana-María Fernández-Pampillón and Antonio Pareja-Lora

Received: 13 March 2016; Accepted: 20 June 2016; Published: 21 July 2016

Abstract: The application of a methodology based on S.C. Dik's Functionalist Grammar linguistic principles, which is addressed to the teaching of Latin to secondary students, has resulted in a quantitative improvement in students' acquisition process of knowledge. To do so, we have used a self-learning tool, an ad hoc dictionary, of which the use in different practices has made students understand, at a basic level, the functioning of this language.

Keywords: education; Latin lexicography; dictionaries; functional grammar

1. Introduction

When learning a foreign language, two types of linguistic knowledge converge. On the one hand, we must focus on the mastery of its grammatical factors, and, on the other hand, we must study its lexicon. As long as neophytes are aware of their skills in the use of the new communication code, they need to improve their knowledge about the function of the language. This involves increasing the difficulty of messages that need to be elaborated in the target language, as well as translations to the mother tongue. The individual natural attitudes of each individual, social needs, or cultural motivations, among others, impact on the apprehension of the use of morphological, syntactic, and semantic structures that differ from the communicative system in which the native speaker has been raised. But how many basic philological tools does the learner possess in the linguistic assimilation process? As a matter of principle, the used resources to solve questions related to morphological, syntactic, pragmatic, and semantic uses seem to be dictionaries and grammatical compendiums. Thus, a double task of linguistic references (grammatical and lexical) is needed, above all, during the first phases of language immersion. Nonetheless, in many cases, the process may be reduced to only one reference, as long as the user possesses a dictionary that organizes all the entries, taking into account the syntactic, morphological, and semantic entries. The help that a lexicographical guide of this nature can provide would be unparalleled because the grammatical information is already offered in the lexical entries and the student does not need to consult grammatical guides, and, therefore, the effort and time of learning would significantly diminish.

Deepening in this investigation project, this work covers a double objective: To try the proposed Latin-Spanish dictionary and to assess the viability of the hypothesis of the use of this lexicographic model in the classroom, together with a suitable teaching methodology that provides students with both individual and cooperative learning. The dictionary has been compiled following the theoretical principles established by S.C. Dik's [1] functionalist linguistics, with the aim of using it in teaching

practice. To assess this viability, we have designed and tested a study case with 15–16 year old secondary education students that study Latin. By doing this, we are trying to determine if the only use for the proposed dictionary constitutes a support tool, which is valid enough for the linguistic analysis and translation of Latin texts adapted to their level. Therefore, the student does not need to use any other complementary grammatical material. For this study, we consider this dictionary as a sufficient linguistic tool to solve the function of verbal and nominal lexical entries of the Latin language during the introductory course of study. We believe it is important to highlight that the dictionary we are presenting is a simplified model, which is adapted to our students. This dictionary has been compiled from a much more complex model, in which the entries on verbs, nouns, pronouns and adjectives gather detailed information about their semantic functions, lexical characterization and their relations with other lexicographical units. This dictionary follows a very similar structure to the one used by Functional Grammar in the description of predicative frameworks.

2. Explanation of the Dictionary

Most important Latin dictionaries have been compiled with a range of theoretical principles that are affiliated to different linguistic schools, with the aim of complementing the strictly semantic information with syntactic or morphological arguments. As an example, we can highlight the *Thesaurus Linguae Latinae* [2] or *A Latin Dictionary*, by Ch. T. Lewis and Ch. Short [3], which have both been compiled following the theoretical principles of the Historical-Compared Grammar, or the *Oxford Latin Dictionary*, a structuralist dictionary by P.G.W. Glare [4]. These three dictionaries are considered as referents in Latin lexicography. In many occasions, this information is useless for the user of the dictionary: Sometimes this is due to the fact that the microstructure of the lemma suffers from lack of systematization in the description of data (i.e., in the case of verbs, the most common mistakes are related to the indiscriminate use of numerals and Roman numbers to distinguish acceptations, incomplete descriptions of grammatical behavior, etc. That is the case in the lemma *Gaudeo* in the *Thesaurus Linguae Latinae*). This lack of systematization causes a continuous hazy feeling in the user of the lexicon. In other occasions, the relationships between the morphological or syntactic data with the semantic ones are not established and certain uses are not justified at all, with a little effective consult (i.e., giving an account of the transitive and intransitive values of the verb at the beginning of the lexicographical entry, and does not distinguish its uses in its different acceptations, as it happens, for instance, in the *Oxford Latin Dictionary* with the same lemma, *Gaudeo*, which we quoted before [5]. This work does not deal with this matter, rather, it proposes a lexicon model that is adapted to the level of teaching that eases, as far as possible, the detected lacks in the mentioned dictionaries. It also helps to improve the comprehension of the functioning of Latin, especially to those teenagers that are facing the learning of this foreign language for the first time. The main aim of this work is to help student acquire a basic knowledge of Latin syntax using the proposed dictionary as an almost exclusive tool to clarify, not only the meanings of the main speech units, but also the relationships that these units have among them, especially between verbs and nouns. Moreover, we try to make a flexible didactic use of the dictionary, making it adaptable for either to face-to-face learning, directed by a teacher, or to virtual and on-site assisted self-learning.

To do so, the verb and noun entries of the lexicon have been organized following the principles of Functional Grammar (FG). This linguistic school considers the predicate as the main element of the sentence. Predicates are defined as a lexeme or a group of lexemes that belong to different lexical categories, that is, verbs, nouns, and adjectives [6]. Thus, to understand the structure of a sentence, we must describe what we call, according to functionalism, a predicative framework [7]. A predicative framework is the number of obligatory constituents (complements) of the predicate (arguments) and the semantic function of each of them [8]. Therefore, a predicate as the verb '*oleo*' in the sentence '*puella rosam olet*' is described as a predicative framework in which two obligatory complements can be distinguished, which are '*puella*' (subject) and '*rosam*' (object). As far as the lexical units are concerned, the FG considers the verb as the main lexical category, followed by nouns

and adjectives. Bearing these two ideas in mind (the description of the predicative frameworks and the importance of the verbal category upon the rest of units), and the type of user we would like to address with our lexicon, we decided to focus on the description of predicative frameworks of the verbs and the lexical characterization of their arguments to articulate the dictionary. We found an obvious reason: A 4th-year secondary education student, with very few exceptions, does not have the necessary linguistic tools to analyze in detail a deep study of the FG principles. For this kind of student, it is enough to understand just the basic concepts (required complements and their lexical characterization and non-required complements) to start with morphological and syntactic simple analysis, with which students acquire certain linguistic skills that can be associated with a future translation. Taking all this into account, the proposed model of dictionary with which we have worked in the classroom takes the verb as the reference lexicographical unit, since these lemmas present a microstructure in which both the semantic and the morphological information are explained. Therefore, the different meanings of the verb are described, taking into account the number and form of the arguments, that is, through defining its predicative framework. In functionalist terms, we can say that the quantitative and qualitative valences of the verbal predicates are distinguished in relation to their meanings. This type of lexicographical description allows the user, where applicable, to distinguish between the different uses of a verbal form according to its obligatory complementation. For instance, in the verb *'loquor'*, different Spanish translations are differentiated depending on the number of arguments: In the case of being complemented by a nominative and an accusative (bivalent predicate), its translation would be "to talk about something". However, if it has nominative, accusative and dative arguments (trivalent predicate), its translation would be "say something to somebody".

It is clear that the description of the verb complements those arguments that are not obligatory but are left aside. They are not obligatory, but they are used to complement the meaning of the predicate. Nevertheless, the semantics and syntax of the verb would not suffer at all if they were omitted. We are speaking about those phrases that provide, for instance, some information about the time in which the verbal action is developed: *'Cicero coniurationem heri locutus est'* (Cicero spoke about the conjure yesterday), where *'heri'* makes reference to the moment in which the conversation took place. These last phrases conform to what we consider, in functionalist terms, omissible or facultative (satellites) constituents, of which the relation with the verb is not in the dictionary since it is not relevant when explaining the functioning of the predicate in the sentence [9] (On Latin, please read [10]).

Bearing in mind the distinction of the complements, the verbal lexicographical entry is structured as follows: Firstly, the equivalent translation, which will be followed by the description of the quantitative valence, which, in the case of Latin, answers a monovalent, bivalent or trivalent type corresponding to the number of verbal arguments (this syntactic information, together with the meaning of the verbal lemma, will be enough for the user of the dictionary to gain an understanding of the complementation that is expected in the consulted verb); later on, the morphological characterization of the verbal arguments is specified according to the Latin cases (nominative, vocative, accusative, genitive, dative and ablative) or to the prepositional regimen (*ad* + accusative, *in* + ablative, etc.). After the morphological information, the lexical characterization of the arguments is provided, that is, the ontological description of the nominal phrases that can function as arguments. This characterization answers some parameters that embrace from human entities to places, explicitly, from the most personal and tangible to the most abstract concepts [11]:

- + animated + human: People
- + animated – human: Animals and plants
- animated + defined: Tangible objects
- animated – defined: Ideas, concepts or feelings
- place: situation, direction, starting or arrival point

This simple ontological description of the verbal arguments (that is gathered in the lexicographical entries of nouns) is related to the morphological characterization of the verbal arguments and restricts

the number of possibilities as far as the distribution of complements and meanings in the basic units that structure the sentence is concerned. The attribution of the labels +animated –animated could be redundant. In fact, the only mention + human, – human, + concrete and – concrete may be admissible. Nevertheless, the description of the lexicon that we present in this study is presented in a XML document, from which the structure of the model of author dictionary we have been working with, is a much more complex model that has allowed us, for instance, to make queries that answer the lexical characterization of the verbal arguments that start from the most general information (with an animated or unanimated nature) to a more specific one (+ human, etc.). These types of queries have provided us (in a different project) with all the data concerning the percentage of the use of arguments with an animated nature versus the unanimated ones with the aim of determining the style of a certain author. The objective we pursue is to compile a conceptual map that helps the student, user of the dictionary, get an idea of how many and how the complements that a verb needs are according to its meaning. What we have previously explained can be illustrated in the following way with this example of a verbal entry:

Do, das dare, dedi, datum

To give (trivalent)

NOM + animated + human

ACU – animated + defined / – animated – defined

DAT + animated + human / + animated – human

The lemma of the verb *do* means “to give” and between brackets, the description of its quantitative valence (“trivalent”) is provided. It is at this point that we would need to make a remark: The concept of “verbal valence” can lead us to make a mistake if we associate it to the terminology that is used by Dependency Grammar (DG). It is true that under this linguistic school roof, based on Tesnière’s principles, some verbal valence lexicons were created in different languages in the 1970s and 1980s (there was even a Latin valence dictionary [12]. To know more about Dependency Grammar and Latin, please read [13]). Although it is true that the FG inherits the theoretical principles of DG, its concept of “valence” is much more developed since it considerably limits the number of verbal complements considerably and is much more specific as far as the definition of the semantic functions and the lexical characterization of the complements are concerned (while Tesnière explains the compulsory complements of a verbs paying attention to syntactic-semantic criteria, the distinction between arguments and satellites that FG establishes answers a universal semantic criterion according to its relation with the States of Affair, that is, with the designation of situations and events that a predicate gathers. Therefore, an argument is an element that is semantically required by a predicate). After that, the morphological description of each of its arguments is specified: Nominative refers to the “person” that carries out the action such as “the one that gives something”; accusative refers to the “object” or “concept” that endures the action, that is, “what is given”, while the dative is referred to the “person that receives something”. As we can observe, we have not made any reference to the syntactic function of the arguments. The omission of this information in the dictionary results from the fact that its consideration is irrelevant in the first stage whenever the user needs to identify morphemes, before assigning functions. Under this perspective, the lexicographical entry could become similar to those proposed by valence dictionaries. The existing similarities between valence dictionaries and certain sections of the description of predicative frameworks of FG show the strong connections between them. Although the simplification of the presented model makes it similar to valence lexicographical models, the dictionary is thought to become more complex according to students’ progress. This way, once we are sure students foster the linguistic analysis of the subject, other semantic functions of the arguments could be further added, which are characteristic of FG, to the lexicographical entries (in fact, that is possible, because these semantic functions are actually described in the model of dictionary from which this particular lexicon is derived). This will not presuppose a considerable impact in the cognitive development of students, whose effort during the current school year has been significant as far as

the acquisition of new skills to face the analysis and translation of the Latin language is concerned. Specifying that an argument performs the function of direct complement, indirect complement, etc., is a later stage that follows the identification of an accusative or a dative which depends on the verb. They are just labels which are used by different linguistic schools to attribute syntactic roles to determined phrases. Throughout the years, these labels have become obsolete by being replaced by others (i.e., the direct complement, which was previously called direct object, or in Spanish, the “suplemento” or “complemento de regimen”). Deepening in a description of this kind would hinder the lexical conceptual map. It would make students reflect on it and they would start their acquisition of the Latin language when consulting the dictionary (S.C. Dik 1997 [1] pp. 118–121; [14]).

As far as the treatment of the nouns is concerned, the organization of the microstructure of these lexicographical entries is simpler than that of verbal predicates. Firstly, we gather the lemma followed by the genre mark (specified with the first letter) [15], its meaning and, between brackets, the lexical characterization that makes reference to its ontology. To illustrate this, we will use three nominal lemmas to exemplify the resolution of grammatical questions (semantically, syntactically and morphologically speaking) by consulting the dictionary:

Mancipium, ii (n.)

Slave (+ animated + human)

Cibus, i (m.)

Food (– animated + defined)

Serva, ae (f.)

Handmaid (+ animated + human)

As far as the rest of the lexical units are concerned, such as pronouns, adjectives, adverbs, prepositions, conjunctions and interjections, we consider that it is sufficient to only provide their meaning. It is true that since pronouns substitute nouns, they have got the same semantic characterization of the noun they are substituting. When they are adjectives, their distinction as epithet, deictic, numeral or classifier [16], is not considered relevant in the syntactic disambiguation of the verb for the level of the user this proposed lexicon model has been developed for (students from last year of secondary education).

To exemplify this, we will utilize the sentence *mancipium cibum servae dat*. After consulting the verb in the dictionary, the reader can gather that the compulsory complements of the predicate *dat* make reference to two personal entities: A nominative and a dative, and to another that represents an object or concept: An accusative. When relating this information offered with the nouns *mancipium* (slave), *cibum* (food) and *servae* (handmaid), the user is aware that these nouns make reference to two human entities and to an object. Therefore, the attribution of roles in the sentence is quite clear, moreover when the unit *servae* could function, morphologically speaking, as a dative (third argument) and *cibum*, exclusively as an accusative. The supposed confusion that the ending *-um* in the units *cibum* and *mancipium* could surface occurs when distinguishing the function as verbal complements. This misinterpretation is clarified through the semantic characterization of these units: While *cibum* makes reference to an object, *mancipium* makes reference to a human being. The first one functions as an accusative while the second one functions as a neutral nominative. Its translation would be the following: “The slave gives food to the handmaid”.

The solution of the sentence, that is, the identification of the different units that shape it together with its translation provide us with a solid argument to defend the proposed lexicographical model. Contrary to traditional lexicography, the application of the descriptive system of a functionalist dictionary can help to solve many questions about the use and the translation of lexical units. Far from being considered just a mere repertoire of meanings, and at best, unstructured morphological uses, the user of the model of the proposed dictionary gets, at a glance, information related to the translation of lemmas and their morphological and syntactic behavior, especially, in the case of verbs, the central focus of the dictionary. The lexicon is innovative for three main reasons: Firstly, it is not a simple

valence dictionary like those that followed the dependency linguistic principles (like, for instance, *Valenzwörterbuch deutscher Verben* (VALBU) [17]). Apart from presenting the valence, it specifies that other lexical units of the dictionary can function as verbal arguments according to their lexical characterization. Secondly, because it is applied to Latin lexicography (it is true that, in Spanish lexicography, there are similar lexicons, but not the same). As an example we can point out the database ADESSE [18], implemented at the University of Vigo, in which all the verbs and verbal constructions in Spanish are gathered, offering a syntactic-semantic characterization). Thirdly, because its aim is that of being a tool of linguistic consult for a very specific user, a secondary education student that studies Latin for the first time.

3. Teaching and Learning Methodology (Used Method): Didactic Use

The use of functionalist grammar as a methodology applied to Lexicography needs a previous explanation about certain concepts that may be unrelated to or unconcerned with those who are not familiarized with the theoretical principles of this linguistic school. In this case, we must bear in mind the intellectual capacity of those who are going to make use of this methodology: A group of 15–16 year old secondary students who study Latin.

Our hypothesis consists of defending, as practical exercises, the diverse uses of the compiled dictionary. According to functionalist methodology, for the first time not only does it equip the student with a linguistic tool to consult meanings, but also to understand, in general, the functioning of the Latin language, thus improving the results of the analytical tests and translations in the classroom. By relating the arguments and the verbal satellites with the meanings of the units, the user learns to design a syntagmatic and paradigmatic conceptual map that helps him/her to understand the use of lexical units (mainly verbal and nominal units, but not exclusively). Before deepening in this system, it is crucial to start taking into account certain knowledge about the functioning of the linguistic system. This knowledge must be acquired by the student in some previous sessions before starting to use the proposed dictionary and methodology. Once the student has digested some basic concepts of the Latin language, for example, nominal and verbal morphology, syntactic functions and word order, the consult of the proposed model of dictionary is enough to understand the behavior of the different lexical units and translate texts from Latin to Spanish and vice versa. We insist on the fact that these texts are always adapted to the level of the users of the dictionary. This is done since the student does not only know the meaning of a given verb, but most importantly, why this verb has got that specific meaning. From a linguistic point of view, the use of the proposed dictionary provides us with some significant short-term rewarding information about certain lexical units. Long term effects can result in the information which will become knowledge and that the student will be able to apply (guided by the teacher) by comparing those morphological and syntactic behaviors of the lexical units already studied to other similar semantic similar units. Not only do we consider relevant the contribution of the proposed lexicographical model to be relevant in the on-site assistance teaching and learning of Latin when the dictionary is consulted, but, also, going beyond, we believe that the structure of lemmas—mainly verbal and nominal ones, may be beneficial when using technological apps that foster the cognitive development of the student in the classroom, thus, easing a greater and better knowledge of the Latin language. We will address this topic further on.

As previously explained, the methodology needs to alternate between two types of sessions [19]. To begin with, some theoretical explanations about the functioning of the Latin language must be presented: Flexibility of its nominal system, use of nominal cases, traditional syntactic functions attributed to the cases, verbal morphology, invariable words, use of adjectives, etc. In these sessions, students need to follow a text book which can be further used when doing some practical exercises and studying the language to consult some linguistic aspects related to Latin syntax and morphology. Alternately, there must be some sessions devoted to explaining basic concepts of functionalist grammar to deal with, for instance, the definition of verbal predicate, argument complements and satellites, lexical characterization of the arguments, translation of types and use of the dictionary from this

linguistic perspective. The sessions whose methodology is focused on the use of functionalist grammar must be taught once, twice or three times a week. During the different sessions we will alternate the activities done by the students individually, in pairs or in groups of five or six students.

We will now present the procedure in detail:

- First session:

Introduction of Functionalist Grammar. Basic concepts: The role of the verb in the sentence; verbal predicate and its components, definition of quantitative valence and classification of the verbs according to the valence; complementation (arguments vs. satellites) and lexical characterization of nouns. Study and analysis of some examples.

- Second session:

Group practice (in pairs): Search in the Spanish language of bivalent and trivalent verbs that can be assigned to their corresponding arguments. Taking the verbal predicates and complements as their starting point, students need to make sentences and provide an explanation of the lexical characterization of nouns to clarify the choice of these nouns as verbal complements.

- Third session:

Explanation and correction of the exercises done in the previous session, justifying the use of verbal arguments. Once the practice is corrected, students work in pairs with the same sentences but now they need to add the satellites.

- Fourth session:

Explanation and correction of the arising propositions of the previous session. The teacher solves questions on complementation (difference between arguments and satellites). Repetition of the practice with monovalent predicates.

- Fifth session:

Practical exercise of translating Latin sentences into Spanish: Morphological and syntactic analysis and translation. We will follow this procedure:

- Search of verbal predicates.
- Verbal valence distinction.
- Identification of arguments and satellites.
- Morphological analysis of the arguments and assignment of syntactic functions, according to traditional methodology [20] (To learn more about didactic methodologies, please consult [21–23]).
- Translation to Spanish.

- Sixth session:

Correction of analyzed sentences in the previous session. Students' questions are solved

- Seventh session:

Individual test. Students, individually, take a test, which consists of three sentences in Latin that must be translated and analyzed.

- Eighth session:

Cooperative learning; analysis and translation of Latin sentences which are presented in the textbook. The exercise must be done in two stages: In the first stage, the student has ten minutes to analyze and translate the proposed sentences. Later on, the student needs to compare the results with his/her group members for ten minutes. Finally, the teacher goes over through the answers of the proposed exercises. This practice is repeated twice.

- Ninth session:

Explanations of the functioning of the Latin adjective and the role of the nominal epithet. Examples of nominal epithets and verbal arguments (attributes).

- Tenth session:

Individual work: Repletion of the evaluation test (after having being previously corrected by the teacher) and reverse translation: Two or three sentences corrected by the teacher, depending on their length, are written in Spanish and must be translated into Latin by students.

- Eleventh session:

Presentation of a functionalist dictionary. Jigsaw activity: The student needs to make sentences with some verbal and nominal lemmas, which are included in different pieces. To do so, students need to use the correct arguments (morphology of the complements and lexical characterization according to the verbal lexicographical entry). The aim of this activity is to instruct the student in the correct use of verbs and complements through a ludic practice. Once students have understood the functioning of lexical units in the Latin language, they will build sentences in Latin bearing in mind the morphological, syntactical, and semantic characteristics of the main verb and the nouns. When a verb is chosen, taking into account its meaning, its quantitative valence and its argument characterization, students consult the noun pieces and choose those nouns that according to their lexical characterization, may function as arguments of the given verb. Finally, students produce sentences using the arguments that are described in the verbal lemmas. This activity is done in groups of four students. The following example illustrates this explanation: The trivalent verb *quaero* is presented to students, who need to choose the appropriate nouns, which are provided in different lexicographical flashcards. These nouns can be adapted, according to their lexical characterization, to the verbal argument of that verb described in the dictionary. The 1st argument, in nominative, has got the + animated + human characterization; the 2nd argument, in accusative, has got a – animated – defined characterization; the 3rd argument expressed by the preposition *ex*, *a/ab* or *de* + ablative, requires a + animated + human characterization. Among the provide nouns, students could choose *bibliothecarius*, *-ii*, *dubitatio*, *-onis*, and *augur*, *-ris* in order to fill in the argumental gaps of the predicate according to the described characterization, and making up the following sentence: *Augur dubitationem ex bibliothecario quaerit* (the augur asks the librarian a question).

- Twelfth session:

The previous session is continued. When it is finished (i.e., each component of the group has made up two sentences), the sentences are completed by adding two satellites. Satellites are taken from the noun pieces (with their corresponding lexical characterization) and adverbs which are given by the teacher to students. Following the previous example, students could reformulate the sentence and add a place satellite: *Augur dubitationem ex bibliothecario in templo quaerit* (the augur asks the librarian a question in the temple).

- Thirteenth session:

In this last stage, the student needs to assign epithets to the arguments and verbal satellites. To do so, students are given a set of cards with adjectival lexicographical entries. Explanation of the structure of the sentences and mistakes correction. Following with the previous example, students could complement the noun *bibliothecario* with the epithet *doctus, a, um* and the noun *templo* with the epithet *augusteus, as um*, making up the sentence: *Augur dubitationem ex docto bibliothecario in augusteo templo quaerit* (the augur asks the wise librarian a question in the august temple).

- Fourteenth session:

Analysis and translation of a text according to the previous procedure. This is individual work, guided by the teacher that answers questions about the meanings of the more difficult propositions, which are more difficult.

4. Study Case (Viability Justification)

4.1. Data and Development

The Latin subject in secondary education is taught to twenty-six students who are split up into two groups. Group I is composed of fourteen students with an average-high academic level, and Group II (the group we have been working with the proposed methodology) is composed of twelve students. All but four students have serious difficulties in the development of linguistic skills. This problem conditioned the academic results in this subject in a pre-evaluation test that took place in October, which brought up a methodological change: A high percentage of students were not able to identify the traditional syntactic functions in Latin sentences, and therefore, their correct translation into Spanish, made us reflect on our teaching practice. We acknowledge that it is opportune to guide the student in another way to make them change their understanding of Latin sentences. We have taught students to structure sentences without using the traditional labels, for instance, that of subject, direct complement or indirect complement, and paying attention to the morphology of the cases that condition the meaning of the verb, that is, nominative, accusative and dative. Once the verbal arguments are identified, they are related to other traditional syntactic functions. Later on, the student arranges the verbal satellites and noun complements, to further proceed, in the last stage, to the translation of the sentence into Spanish. To do so, we taught students how to use a functionalist dictionary, aiming to observe the relationship that the meaning of determined linguistic units and, the surrounding complements and their very nature have.

We started the practice on 23 October 2015, taking as a starting reference point the evaluation test that took place on 8 December 2015, as point of reference. The second key date was 3 March 2015, when the second evaluation test took place. It is important to note that these have not been the only tests because throughout the two terms we administered different tests to check students' comprehension development in a short term.

We will now specify how we have proceeded in each of the day's sessions:

- First session (23 October)

We explain the basic concepts of Functionalist Grammar; the importance of the verb in the sentence; what a verbal predicate is; what a quantitative valence is; what classification of the verbs we can have in Latin, making reference to its valences; what the arguments are; what the satellites are; what the lexical characterization of nouns consist of. Examples.

- Second session (26 October)

Group work (six groups of two students each). The practice consists of searching for two bivalent and two trivalent verbs in Spanish and assigning their corresponding arguments. The result is

materialized in four short sentences that are translated into Latin with the teacher who is providing the Latin lexicon's help. The congruence of the sentences depends on the meanings of the verbs and the use of the nouns that have got an argument function that provide the coherence of the sentences. Finally, the noun lexical characterization is explained and analyzed which determines the choice when assigning complements.

- Third session (28 October)

Shared correction (on the board) of the proposed exercises in the previous session. Each group writes its examples on the board explaining the functioning of the used verbs on the board (explaining the use of the complements). The practice, in Spanish, does not seem to be very hard. Searching for verbs with different valences and arguments, despite previous discussions, worked out really well. Once the practice is corrected, each group continues working with the same sentences, but adding satellites to them.

- Fourth session (30 October)

Shared correction (on the board) of the clauses that one or two satellites have been added to. The satellite and argument concepts are clear enough. Using the students' proposed examples as a starting point, an explanation of the differences between satellites and arguments is given. Once the students have understood them (some satellites may be confused with arguments), we repeat the exercise, this time using some monovalent verbs.

- Fifth session (6 November)

Morphological and syntactic analysis and translation into Spanish of the Latin sentences that the textbook provides. The teacher guides the practice pointing out the methodology they must follow:

- Search of verbal predicate.
- Determination, according to its Spanish meaning, of the quantitative valence of the verb.
- Identification of arguments and satellites (if they exist in the sentences)
- Morphological and syntactic analysis (according to traditional methodology) of the arguments.
- Translation into Spanish, according to the proposed analysis.

The length of the sentences impedes the exercise to be finished before the end of the session. Students must finish this practice at home individually.

- Sixth session (11 November)

Shared correction (on the board) of the morphological and syntactic analysis and the translation of the sentences that were used in the previous session. The task is difficult as the students have not first looked for the syntactic functions, but for the morphological suffixes. The change in this practice has been very positive, but students need to continue working on it. The teacher solves questions related to case attribution.

- Seventh session (13 November)

Individual task. Students must take a test that consists of three sentences written in Latin to be analyzed and translated. The results of this test show the viability of the methodology used: Another similar test was done at the beginning of October, before starting with this methodology, and the majority of the students have improved their marks. Ten out of the twelve students improve their marks, an outstanding feat since this test is more difficult than the first one (the grammatical contents of the test are harder than the ones taught previously).

- Eighth session (16 November)

A 50-minute session is devoted to the analysis and translation of sentences that are gathered in the textbook. The exercise is done individually and the results are later on compared with their partners'. The level of participation is astonishing. Students discuss the attribution of certain complements. Finally, the teacher goes over the proposed exercises on the board.

- Ninth session (23 November)

Explanation of the adjective and its function as nominal epithet. Analysis and translation of a short text from the textbook. This text has got first and second declensions and verbs in present and imperfect tenses. Students are already familiar with this kind of methodology. The mistakes they have made are not significant, rather, they are syntactic mistakes that do not infer in their translation because the morphological analysis is correct.

- Tenth session (14 December)

Individual work: Students are given a copy of the evaluation test to work on a new text. The teacher analyzes the text on the board following the functionalist method. Later on, students translate these sentences from Spanish into Latin. With the exception of three students that decided not to collaborate and work on this task, the rest of the students do this practice successfully. They are comfortable working with this methodology. We must highlight that it is harder to translate from Spanish to Latin than vice versa.

- Eleventh session (3 February)

Presentation of a functionalist dictionary. Jigsaw activity: Students must create sentences taking the different pieces of the jigsaw where the verbal and nominal lemmas are presented. The aim of this activity is to motivate and train the students to understand and build sentences bearing in mind the morphological, syntactic and semantic characteristics of the main verb. Once a verb is chosen, and according to its meaning, its quantitative valence and the characterization of its arguments, students must consult the noun pieces and choose can function as arguments of the chosen verb according to their lexical characterization. Finally, they must make sentences respecting the case study of the arguments as they are described in the verbal lemmas. The difficulty lays on finding the suitable nouns that perform the argument functions. Some mistakes are made when students must inflect nouns. Nevertheless, these mistakes are corrected and explained by the teacher that is assessing students in the task. This activity is done in groups of four students (all students are very engaged in the activity with the exception of one group).

- Twelfth session (10 February)

The activity that was started in the previous session continues. Once the sentences are completed (two sentences per group), they must add two satellites to each of them. These satellites must be chosen taking into account the noun pieces that were chosen in the previous session and the adverb pieces that are given to students in this session. Sentences are corrected on the board. When mistakes are made, students are the ones that analyze and solve the questions (on two occasions, an argument is missing and on three of them there is a morphological mistake).

- Thirteenth session (12 February).

The last stage of this activity consists of adding epithets to the arguments and verbal satellites. Students are given adjective pieces. They must work as in previous sessions: They need to add each epithet to the corresponding noun. When the activity is done, the sentences are corrected on the board.

- Fourteenth session (15 February)

A textbook entry analyzed and translated. Students use the glossary of the book as a tool to look up the meaning of the lexical units, aiming to determine if students are able to apply the proposed methodology when consulting a standard dictionary. It is individual work and the teacher answers the questions that are related to the meaning of certain sentences that are unclear with the translation that the glossary provides. Moreover, the teacher clarifies the meaning of certain words that are not compiled in the glossary and solves some morphological problems. The parisyllabic cases of the third declension are explained. The 50-minute session is exclusively devoted exclusively to this activity.

4.2. Results and Discussion

The results of the tests guarantee its projection in the classroom. We can observe the results in the following chart, where qualifications range from 0 to 10 points, being 10 points being the maximum mark and 0 being the minimum one (See Table 1):

Table 1. Different test results.

IDStudent	Initial Test	Test 2	Test 3	Test 4
A	1.8	8.75	6.12	6
B	5.6	8.25	8.75	5
C	0	3	2	1.5
D	1.8	2.5	2.25	2
E	6.25	9.5	8.75	9.65
F	9	9.7	8.12	7.25
G	7.5	8.25	7.25	9.65
H	2.5	7.75	7.25	5
I	7.5	7.25	9	8
J	8.1	7.5	10	9.75
K	6.8	6	9.25	9
L	0	5	0	2

The data is quite objectively and decisive: The average mark of the group improves upon exposure to new methodology, moving from mark of 4.73 in the first test to 6.58 in the last test (test 2: 6.95, test 3: 6.56, test 4: 6.23). The rising percentage is around 40% (39.11%). Paired t-test results between Initial Test and Test2, Test3 and Test 4 prove that by conventional criteria ($p < 0.05$), this difference is considered to be statistically significant (the calculations were made with *Quickcals* tool [24]).

When compared to the first test results, it is an outstanding number. We would like to highlight the mark improvement bearing in mind that the difficulty of the contents was gradually higher as far as the term continued. However, student F has lowered his marks in the last two tests and his average mark is below his first test. After having analyzed the results with the student, he explained that he simply had not complied with the guidelines asked of the class, nor followed the new methodology [25] (To learn more about didactic methodologies, please consult [22–24]).

The following bar chart clearly illustrates the learning progress, where the marks of the different tests can be compared:

In the case of students C and L there is no first test. They did not want to take the first test and handed it in without filling out the exercise. The test was graded with zero points. The same case also applies to student L in test 3.

Apart from these outliers, we have administered an objective test with students of both groups (the ones that are following this methodology with the ones that are not) with the aim of checking the level of mistakes made in each of them in the morphological and syntactic analysis of five Latin sentences. The results show that the methodology used (Group II) helps students make less mistakes when identifying lexical units and translating sentences into Spanish (See Tables 2–4 and Figure 1):

Table 2. Paired t-test results.

Data	pValue	Confidence Interval (95%):	The Mean of Initial_Test Minus Test I	Intermediate Values Used in Calculations:
Initial_test and test 2	$p = 0.0116$	[−3.8319, −0.6014]	−2.2167	$t = 3.0205$
				$df = 11$
				standard error of difference = 0.734
Initial_test and test 3	$p = 0.0044$	[−2.9474, −0.7011]	−1.8242	$t = 3.5750$
				$df = 11$
				standard error of difference = 0.510
Initial_test and test 4	$p = 0.0101$	[−2.5581, −0.4336]	−1.4958	$t = 3.0993$
				$df = 11$
				standard error of difference = 0.483

Table 3. Group I (control group).

Group I Students	Morphological Mistakes (Out of 20)	Syntactic Mistakes (Out of 16)
A	3	4
B	15	14
C	5	8
D	3	3
E	18	14
F	10	11
G	7	6
H	9	7
I	8	8
J	17	11
K	9	8
L	11	10
M	8	9
N	8	3

Table 4. Group II (test group).

Group II Students	Morphological Mistakes (Out of 20)	Syntactic Mistakes (Out of 16)
A	9	2
B	5	5
C	20	16
D	15	10
E	2	2
F	3	2
G	6	6
H	7	7
I	10	12
J	5	4
K	3	2
L	20	16

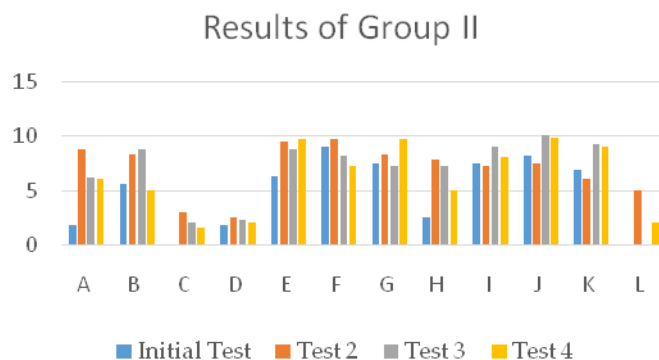


Figure 1. Results of Group II.

Leaving the global results aside (see Table 5), we must point out the case of student F. We can see that the small number of mistakes in the last test is significant. We asked the student about the use of the methodology in the test and the student did use the functionalist methodology. Therefore, we can conclude that the improvements in the results, are due to the use of the proposed methodology.

Table 5. Global results.

Group	Total Amount of Students Taking de Test	Morphological Mistakes	Syntactic Mistakes
I (control)	14	131	115
II (test)	12	105	84

As the results show, the difference in the number of linguistic mistakes is similar, taking into account that the number of students in Group II that took the test was inferior to that of Group I. The morphological mistake average in Group I is 9.3 versus Group II's 8.6, where the average difference concerning syntactic mistakes is increased; Group I has got 8.2 versus Group II's 6.8. It is true that Group I has got two students more than Group II and that the number of mistakes is slightly inferior, but Group I's academic level is much higher than Group II's level. The fact that a group with such a low academic level at the very beginning (Group II), ended up having a similar number of mistakes to Group I (with a higher academic level), is significant.

5. Conclusions

Due to the results obtained in the different tests, we can tell that the methodological change has positively influenced in students' cognitive development. Their knowledge of the Latin language has been significantly increased both quantitatively and qualitatively speaking. With very few exceptions, students have increased their marks, and at the same time, they have proved a better knowledge of the functioning of a language that they study for the first time, which is notably different from their mother tongue. Their attention in the classroom has also improved as they begin to realize their position as the protagonists of the process, especially, during the sessions that are devoted to the use of the dictionary: They interact with one another and explain and justify their results with linguistic rationale to other peers. These skills have been acquired thanks to the strategies we have applied in the classroom, that is, the use of a dictionary that answers semantic questions with morphological and syntactic information and the ludic dimension of the jigsaw practice, which allows students to structure Latin with the main and secondary components of a sentence. It is important to note that, with a high percentage of correct answers, students have been able to apply the textual analysis methodology we have trained in the previous sessions, making use of a traditional glossary to look up the lexicon of the sentences they did not know in the last translation test. If we portray percentages, the obtained results after the morphological and syntactic analysis of this test guarantees our methodological hypothesis: Group I achieves a rate of 46.78% concerning morphological mistakes and a rate of 51.33% of syntactic mistakes.

Group II mistakes have diminished, showing a rate of 43.75% of morphological mistakes and also a rate of 43.75% concerning syntactic ones. Although the difference between both groups may not seem significant (3.03% difference concerning morphology and 7.58% concerning syntax), and although Group I has got two more students than Group II, if we take into account another factor, which is the average academic level of both groups (the global average mark of Group II is inferior to that of Group I). We believe that the difference between both groups plays a significant role here. We could deduce that the method used in this teaching practice has helped a group of students with a low academic level to acquire, in a fairly easy way, some basic knowledge on the functioning of the Latin language relatively easily. Moreover, they have been able to showcase this knowledge by applying it to practical tasks.

Therefore, the model offers satisfactory results that motivate us to move forward with this methodology. However, this work is not finished.

Future Work (Digital Dictionary and Training Video Game)

The dictionary we have presented in this work is born out of an author lexicographical model, developed in XML, whose structure allows us the exploitation of its entries according to different criteria: Type of user, type of consult (semantic, syntactic and morphological), type of work, etc. In this case, we decided to work with an essential structure to create a basic dictionary that could be used when teaching and learning Latin in elementary levels. The dictionary is compiled with two thousand lemmas in a digital format, and it will be finished before the beginning of the next academic year. Together with this linguistic tool, the student will use a corpus of Latin sentences and brief texts whose lexical units will be collected in the mentioned lexicographical guide, so that all its entries can be consulted by the student in the dictionary. Furthermore, we strongly believe that this dictionary may give rise to a computer tool such as a video game that commands students' attention since these students, real digital natives, have been brought up surrounded by attractive tools, such as mobile phones, laptops and tablets. Our proposal is the basis to build an ICT tool that eases the learning of the Latin language inside and outside of the classroom. We have proved the viability of the paper dictionary and its use in the classroom. The implementation of this ICT tool, together with the consult of the lexicographical model that we have proposed in this work, will surely foster the study of Latin and will improve the academic results in this subject whenever students face a new challenge.

Author Contributions: The authors have made equal contributions to the writing of the paper.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix. Dictionary examples.

With the aim of illustrating the verbal and nominal lemmas with which our students have worked, we will show some examples of the dictionary that were included in the lexicographical flashcards and were used and tested in the classroom:

Adsigno, -as, -are, -avi, -atum

1. To Award (trivalent)

NOM + animated, + human

ACU – animated + defined / – animated – defined

DAT + animated + human

Contendo, -is, -ere, -di, -tum2. *To Tighten* (bivalent)

NOM + animated, + human

ACU – animated + defined

3. *To Fight* (bivalent)

NOM + animated, + human

CUM + ABL + animated + human/ – animated – defined

Adulescentia, ae (f.)1. *Youth* (– animated, – defined)**Baetica, ae (f.)**1. *Betica* (place)**Cantor, oris (m.)**1. *Singer, musician* (+ animated, + human)*Test Content (summary)*

Regarding the content of the tests used to assess students' cognitive progression, the tests are structured in a way they can measure students' morphological, syntactic and semantic knowledge through the analysis and translation of certain sentences from Latin into Spanish. The first test included five sentences with nouns and adjectives of the declensions with –a themes and present tense verbs. The second test was focused on the analysis and translation of six sentences with nouns and adjectives of the declensions with –a and –o themes and present and imperfect preterit tenses. The third test was focused on the consonantal declension and future tenses. The student needs to translate, after developing a linguistic analysis, six sentences in which nouns of the three different declensions, –a and –o themes adjectives and verbs in present, imperfect preterit and future tenses were mixed up. Finally, the fourth test gathered all the nouns and adjectives that had been previously studied during that period of the school year plus the –i theme vocalic declension, and present, imperfect preterit and future verbal tenses. Students are asked to analyze and translate six sentences from Latin into Spanish. Students were given 45 min to do the different tests.

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5. To know more about the mentioned mistakes, please see Márquez, M. *Léxico de Autores Latinos en Formato Digital: Elaboración de un Modelo y su Aplicación al Léxico de los Escritos Consolatorios y Elegías a la Muerte del Príncipe Juan*. Ph.D. Thesis, Universidad Complutense de Madrid, Madrid, Spain, 2015. pp. 78, 86.
6. Pinkster, H. *Latin Syntax and Semantics*; Taylor & Francis: Oxford, UK, 1988; p. 3, The author provides a concise definition of Predicate and its types.
7. In a sentence, the predicate and its arguments determine a situation or concrete event, that is, the "State of Affairs" (SoA). The content of that SoA depends on the meaning of the predicate. That meaning, together with the number of arguments and their semantic function conform what is known as predicative framework. Therefore, each predicate has got one or more predicative frameworks. Nevertheless, to make lexemes have a concrete semantic function, they must have determined semantic features or characterizations: The semantic function of the Agent can only be performed by lexemes with a + human characterization because it requires some "control" on the action of the predicate. To know more about SoA, please read Siewierska, A. *Functional Grammar*; Routledge: Oxford, UK; New York, NY, USA, 1991; pp. 43–53.

8. The semantic functions would be Agent, Patient, Receptor, Addressee, Direction, Place and Zero. To know more about these Dik's semantic functions, please consult Somers, H.L. *Valency and Case in Computational Linguistics*; Edinburgh University Press: Edinburgh, UK, 1987; pp. 94–108.
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13. Happ, H. *Grundfragen ciner Dependenz-Grammatik des Lateinischen*; Vandenhoeck+ Ruprecht Gm: Gotinga, Germany, 1976; From this work publication, functional (not functionalist) lexicons of verbal valences arise.
14. In this study, we endeavored to find an instrument that clarifies the uses of the lexicon of the Latin language in basic levels in conjunction with the claim for providing a detailed thorough description of verbal complementation. In fact, the categorization of the functions of the verbal arguments is possible in a lexicon, as far as the following two premises are taken into account: On the one hand, the use of some labels that eliminate as far as possible whichever ambiguity; and, on the other hand, the type of user the lexicon is thought for. We consider that S. C. Dik's Functional Grammar provides us with a coherent and logical theoretical framework when the semantic functions of the arguments of a verbal predicate are defined.
15. The first letter would be m. for masculine, f. for feminine and n. for neutral.
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18. ADESSE. Available online: <http://adesse.uvigo.es/data/avanzado.php> (accessed on 27 April 2016).
19. Each session is fifty minutes long.
20. The expression "traditional methodology" should be noted. When talking about it, we refer to the teaching of Latin in Spain, which does not vary very much from methodologies used in other European countries. It refers to the Grammar-translation method. Historically, there have been four different methods in the teaching of the Latin language. The first method is the Grammar-Translation method which consists of remembering morphological, syntactic and vocabulary rules. This knowledge is little by little applied to the translation of sentences in Spanish little by little. In Spain, this has been the most popular method to teach Latin. The second method is the Natural Approach, which is focused on the learning of the language through drills and repetitions. It consists of the memorization of Latin sentences or small texts that students repeat continuously. Later on, they must establish a relationship with a given translation of the same sentence or text. By doing so, students learn certain structures that can be applied to similar sentences. The 3rd method is the Ørberg method, which proposes the immersion of the student into the Latin language. To do so, students are given some contextual information that allows them to deduct meanings without needing a glossary. It is based on the theory Information +1 (there is an unknown element that the student is able to understand thanks to the context). It is also described as a contextual method; finally, the communicative approach, also with a contextual framework, with which the student must fill in the gaps of a dialogue, a strip that represents a daily routine, etc.).
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25. The reader must bear in mind that this study is done with teenagers. Lack of maturity and professional and intellectual concerns significantly affect this sector of population, that, sometimes, makes decisions without any kind of justification. The work of the teacher in the classroom with teenagers presupposes accepting a certain margin of errors in the assessment of the didactic practice. An undergraduate student is mature enough to organize the study of the different subjects. The choice of a University degree, of certain subjects, and of a working plan during his/her practical and intellectual training do not answer arbitrary criteria that vary according to their moods. A teenager, in a large percentage, answers stimuli which are based on innovation in the classroom, short term academic results and the surrounding atmosphere. When they feel a higher emotional intensity, that is, during exam periods or holidays, they establish certain priorities in which those subjects they believe they control are left unattended. If we pay attention to the grades of the different tests, there is a slight decrease of grades in certain students. This is, in fact, the margin of error we were referring to before. The method works successfully. We continue to administer tests with similar results to the ones we have presented in this work. Tests 3 and 4 were done during the exam period at the end of the term and after Christmas holidays which are very emotional periods. Not all the students face tests in the same way and this is what tests show. But among all the cases the most shocking one is student B, whose final grade (not included in this work) is that of 8.75 out of 10 points. Taking into account the difficulty of the test (the most complex and difficult one of all), the student is able to explain the structure of a Latin sentence, justifies her translation into Spanish with a linguistic analysis, but she is unable to develop a correct syntactic analysis in Spanish, a language that is taught following a completely different methodology.



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