



Study On Textbooks: Innovative methodology applied to Histology and Embryology in Dentistry

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Introduction:

An approach to the study of accessibility and representation of knowledge in the field of university studies supposes searching and recognition of the media. The media, just as the other components of the curriculum, make sense and are defined with respect to the logic and functionality granted to it within a particular curriculum system.

In principle, we distinguish two main groups: formal and informal media. The first group comprises textbooks, periodicals, specialized journals, the so called grey literature - represented

by thesis works, dissertations, seminar or congress published reports - and any other form of customary presentation. However, we consider informal media those virtual representations derived from the use of the Internet and new technologies.

As a consequence, it is necessary to highlight the quantity and variety of resources that may contain academic information in the field of study, which is impossible to analyze briefly. That is the reason why our first step is to develop only the study on textbooks, since they are considered to be the resource used par excellence in the development of the teaching-learning processes.

Thus, the main purpose of this work has been the desire to provide with an innovative contribution to the study of textbooks and its subsequent application to the teaching activity. Based on the foregoing, we expect to improve the efficiency of the university learning-teaching processes in order to upgrade its quality and have a favorable effect upon the role played by teachers and students.

This work was developed within the framework of the Project "Areas of knowledge integrated into the curriculum of the Faculty of Dentistry of the National University of La Plata: basic knowledge and its recovery in the Clinical Subjects" of the Instituto de Investigación en Educación Superior.

The project states among its specific objectives the following:

- Establishing a correlation among the bibliography contents of the subjects Histology and Embryology in dentistry and the bibliography of the clinical subjects.
- Identifying emerging problems in the processes of curricular integration of basic and clinical contents in the dentistry academic training.

- Establishing whether the basic and/or reference bibliography in the clinical subjects includes texts referred to in the bibliography of the subject Histology and Embryology in dentistry and determine the update level.

The units of analysis are the programs and bibliography of clinical subjects related to Histology contents.

The object of study comprises the teaching knowledge defined as those included in the theme units in the subject Histology and Embryology of the Faculty of Dentistry of La Plata.

The contents dealt with within the framework of this work were the following:

- a) Importance of the textbook, its evolution and concept at present.**
- b) Short review of the issue state concerning textbooks research.**
- c) Methodologies applied to the approach on the study of textbooks.**
- d) Methodology applied within the framework of this study.**
- e) Detailed application to the selected textbook.**
- f) Conclusions.**

a) Importance of the textbook, its evolution and concept at present.

The textbook is considered to be a powerful tool of widespread use in science lessons (Otero, 1990). Quoted by Concari, the same study reports that "...The relation between learning and the textbook has been a recurring object of study (Alexander et al., 1994; Concari et al., 1999). The studies by Portolés et al. (1993) and by Tulip and Cook (1991) show, effectively, that reading material strongly conditions learning.

It is habitual that the use of a textbook in the development of teaching and learning processes somehow determines, in many cases as stated by Henson (referred to in Area, 1991), the actual curriculum. This fact makes the choosing of the textbook an important task (Monterrubio, 2011).

For this reason, we can indicate that resources, and especially the textbook, functions as an integrated element of the curricular reality and according to what was pointed out by Fernando Acero, "...university textbooks play a fundamental role in education... since they provide the structure for the teaching and learning processes, exert a decisive influence both on teachers and students, and not only are they source of curricular contents but also an arranged exhibition of an organized structure of a knowledge corpus, along with an implied didactic style" (Compare with Valverde, 2002; Mouzakitis, 2006: 2; Seguin, 1989) according to the nature and philosophy of the academic contents in which they have been originated and/or selected and in concordance with the ideal student.

The media, like the rest of the curriculum components, function and consolidate in relation to the method and function given within the curricular system framework.

According to the nature of the system, and the type of interaction and logic among its processes and components, the media will adopt roles and characteristics that are coherent with the conception, purposes and structure of the curriculum under which they function.

We can thus state that the textbook, unlike what the other resources offer, proposes, conditions and imposes (when it is used in an exclusive way) a specific project of curricular development, that is to say, we may characterize the textbook as a set of prearranged methods and curricular techniques. The rest of the media do not have the ability to integrate and operate all the curricular components (objectives, contents, methodology, activities, evaluation...) to be offered to teachers in a finished and organized format to be implemented at the time of teaching a subject. (Compare with Zabalza, 1985; Area, 1985).

With the purpose of specifying our object of study and the terminology used in the context of this work, we will attempt to determine what we understand by textbook in this work.

"The research on the textbook has not been established as an autonomous discipline yet" (Jhonsen, 1996). Consequently, we consider it essential to differentiate – coincidentally with some authors – between "textbooks" and "schoolbooks"; books created with the specific purpose of being used in the educational field in order to help in the processes and, books that even being used in the classrooms had not been created with that only purpose (Calderero, 2002; Jhonsen, 1996).

In the creation, production, diffusion and use of textbooks there are implied innumerable stages, starting with the author's conception, passing through the complexity of the publishing business, and anchoring in the educational area: design, writing, translation, correction, production, distribution, and the like, such as the selection of some of the faculty members and its consolidation in the presence of teachers and students in the learning situation.

It could be safely argued that a "textbook" is any manual or summary of written information also/or used with the purpose of transmitting knowledge. Strictly speaking, it refers to those books created with the purpose of transmitting knowledge organized into a structure, selected by the enforced teaching community and which is described in the specific bibliography of the official education programs, supported by well-known professors who specialize in certain discipline in different countries

b) Brief review of the issue state concerning the research of textbooks

The election of textbooks in education has been studied to determine throughout times, the insertion of different educational policies in favor of particular interests of nations.

Some of the reasons of the textbook success over other resources can be found in the following abilities:

- They display the state of a discipline at a given moment accepted by the academic community.
- They present a corpus of organized and systematized knowledge for its divulgation.
- They aim at developing contents with controlled aspects such as redundancy, dispersal and vagueness of concepts.
- They standardize the discourse of a discipline compiling the predominant ideas.
- They introduce a methodology for the acquisition of knowledge.
- They generally contain activity guides aimed at the development of students' abilities and skills.
- Some include evaluations with the purpose of confirming the acquisition of the knowledge, abilities and skills taught.

However, the following weaknesses may appear:

- They present a standardized discourse that aims at being objective, and if it is used in an exclusive way, there is risk of underestimating the personal original contributions by other researchers, teachers and students, depriving them from the possibility of creating conceptual tools for the solution of problems.
- Obsolescence. It is related to the time taken by publishing, educational bureaucracy and science advances.

"Textbooks are the curricular materials preferably used by teachers in our country at all educational levels, fact that can be confirmed with the enormous yearly sales volume".
(Cintas Serrano, 2000)

"The use of textbooks is undoubtedly one of the main ways of school science transmission in our classrooms. Despite the attempts by the educational managements, from the sphere of research on experimental science didactics or from the actual teaching staff, merely to incorporate the multiplicity of resources available today, both academic (field practice, laboratory practice, computer science, etc.) and extracurricular (means of communication, science centers, etc.) to this end, reality comes to show that the textbook is the most widely and accepted means - sometimes the only one - by the school community (teachers, students and parents)" (Jiménez Valladares, Juan de Dios and Perales Palacios, F. Javier, 2001 p.3 - 4) (Calderero Hernández, 2002)

Hyland ⁽²⁰⁰⁰⁾ studies the university textbook from a socio-communicative approach and defines it as a deposit of codified knowledge, since it presents the accepted paradigms of each discipline and, by representing orthodoxy (the set of accepted ideas), it communicates already demonstrated truths that are necessary to the basic training of students.

In the case of university textbooks it can be stated that they have become the most important resource to recognize which exactly is the meaning of the concept accepted by the

scientific community, that is to say, they become authority since they present the problems, data, theories, laws and concepts prevailing at a given moment. This is done with the purpose of persuading and attracting those students who are just acquiring knowledge. This leads us to confirm that textbooks constitute one of the most important didactic pedagogical resources now existing and are part of the resources to which students turn to as object of study, reference material, collection of recommended exercises and problems to be solved (Granes and Caicedo, 1997, Cabrera Castillo, 2012).

From the historical point of view, textbooks are considered an element for the cultural and social manipulation of individuals. In these textbooks, some preferred contents are chosen, they have a specific structure that contain hierarchically organized knowledge supporting both students and teachers' tasks and which, according to the author, have different purposes concordant with their own thoughts, which usually standardize the discourse of the discipline based on the dominant ideas to be then disseminated among readers (González and Sierra, 2004).

The description detailed by Jiménez Valladares in his work "Analysis of Textbooks" of the "desirable relationship of qualities" that textbooks must possess is very interesting.

With respect to the information compiled in books:

- Exactitude and updating of information.
- Didactical and logical sequence in the presentation of contents and language use.
- Presentation of topics that catch the interest of students.
- Inclusion of data for the observation and reflection above action.
- The didactical tool must attract the attention to those elements assisting comprehension, not to minor elements.

With respect to the need of dealing with the varied students and types of learning:

- Adjustment to the characteristics of students and their vocabulary.
- Offering the possibility of modifying, choosing and readjusting materials. Attention to diversity.
- Dealing with the values of a democratic society.
- Attention to procedural and attitudinal contents.
- Categorization of activities depending on the type of work expected from the student. They must be understandable, varied, viable and significant.
- Recommending activities that provide new fields of knowledge and practice to students.
- Materials for the search of information.
- Proposals must be open in order to help developing the different possibilities of interpretation of texts.

With respect to physical characteristics of documents:

- Careful illustrations at the service of contents.
- Careful design, typology and overall presentation."

In summary, as pointed by Jiménez Valladares, the textbook not only aims at summarizing the knowledge state of a discipline, but has also evolved at present and tends to organizing the experience in the classroom by asking questions to the students and proposing activities and problems under the teacher's supervision.

Bad textbooks are a true disaster for any nation; good textbooks, on the contrary, are a priceless benefit and mean investing in our international future". (Jhonsen, 1996).

c) Methodologies applied to the approach of textbook studies

It is noteworthy the variety of disciplines that, one way or the other, are related to the Content Analysis, among which we can quote: Political Science, Psychology, Literary Criticism, Sociology, Linguistics, Information Technology, Library and Information Science, Bibliometry, Didactics, etc.

In this vast scenario, we have focused on those references we considered more related to our work.

The items were studied in the field of the disciplines Library and Information Science. We define as items any support liable of containing information. Thus, we included in this category the object of our study: textbooks.

As from the analysis of Library and Information Science and Bibliometry, there are usually two levels to address the analysis of the items *citation analysis* and *content analysis*.

Other authors make a difference between different levels. The *situational level* refers to the knowledge possessed by the communicator in a given situation and the participants of the communicative process, that is to say the circulation of the text, institutional framework and type of communication and context. The *functional level* is connected to the knowledge of the text role in the interaction process, namely its purpose and function, and is recognized because of the text organization. The *semantic level* corresponds to the information selection, layout and organization: study and scope, and validation sequences of the outlined hypothesis. And the *formal level* refers to the text surface, knowledge in the comprehension and selection of linguistic resources for the formulation of texts. It takes into account texts, illustrations paratexts, bibliographies, summaries and all types of resources. (Compare with Grupo TERMTEX directed by G. Ciapuscio and made up of researchers from UBA, CONICET and National University of General Sarmiento).

However, Morris distinguishes in the treatment of the text *corpus*, the levels of *syntactic*, *semantic* and *pragmatic* analysis, paying special attention to the choice of the research strategy and the articulation of its objectives. In this way, the syntactic level is materialized in the study of the vocabulary and the frequency of appearance of lexical forms and, the semantic level focuses on the identification of the minimal significant units and the place they occupy in the text corpus. The latter implies a contextual theory of meaning and is indiscernible from the pragmatic aspect implied by the text.

Monterrubio and Ortega ⁽²⁰¹¹⁾ quote the study by Escudero ^(1983a), which says that the textbook is made up of three aspects:

- (a) semantic, that is to say, its contents;
- (b) structural-syntactical, which makes reference to its form of organization and system of symbols; and
- (c) pragmatic, which take into account its use, purposes, and the like. This last aspect evidence that the analysis of a text cannot be done in an isolated way but, as pointed by Gimeno ⁽¹⁹⁸⁸⁾ and Santos ⁽¹⁹⁹¹⁾, it is necessary to take into account the use pretended to be made of such material in the classroom and the model of teaching and learning desired to develop.

Methodology:

d) Methodology applied in the framework of this study

The varied existing classifications, the diverse use of textbooks and the specific discipline contents have compelled us to elaborate an innovative methodological design.

This design attempts to meet a need in the study of textbooks for dentistry. Confirming the complexity of the textbook led us to establish a specific taxonomy in order to analyze in detail this work.

The division into levels is clearly a methodological division since, in texts, the information corresponding to each level appears in an interrelated way. In effect, a relation of mutual conditioning exists between the levels and parameters shared in the complexity of the evolution of the textbook for dentistry immersed in the learning processes.

In summary, taking into account the contributions done to this study as regards the items derived from the field of Library and Information Science that have historically focused on the description of the form, we have taken this description to arrive from an analysis centered on the formal characteristics presented by the textbooks that we will develop in detail later on, giving shape to which we will refer to in our field as **Level of Formal Analysis**.

Derived from the same disciplinary field, semantic and syntactic analyses have been summarized in what is referred to as **Level of Contents Analysis**. It comprises both the syntactic structure and its form of organization, as well as the system of symbols and the disciplinary contents of knowledge.

Lastly, a **Level of Pragmatic Analysis** where we will consider the purposes, uses and context where the communicational relationships and the teaching model intended to apply in the classroom are established. We are referring to who writes it, which they write it for and who really uses it, and in which context the communication process is established, as pointed by Gimeno⁽¹⁹⁸⁸⁾ and Santos⁽¹⁹⁹¹⁾.

↻ Level of formal analysis:

It comprises the technical-graphical aspects related to publishing and any other characteristic dedicated to identification. As an example, there follows a list that attempts to be illustrative, but not exhaustive:

Identification data of the text:

Title proper, parallel title, alternative title, any other title information.

Main responsibility, other types of responsibility as that of collaborators, translators, etc.

Data related to publishing: place, Publisher, date, edition number, type of edition, etc.

Data related to the inner structure:

Cover.

Prologue or equivalent.

Introduction.

Guidelines for text use.

Explanatory notes.

Chapter indexing.

Physical details of the material: size, length, other physical details, supplementary material, etc.

Theme or subject indexing.

Name indexing.

Illustration indexing.

Glossary.

Chapter bibliography.

General bibliography.

Illustrations: diagrams, photographs, maps, graphics, charts, drawings, etc.

➡ Level of content analysis:

We obviously agree in the following:

"Semantics is the study of linguistic units. Consequently, it affects the main material of content analysis: meanings." (Bardin, 1986).

In order to organize a Content Analysis there is no need of coincidence as regards meanings, although if there is "intersubjective agreement", analysis is much simpler.

This agreement can only exist "in relation to the most obvious or 'evident' aspects of communications, or else for a few people sharing the same cultural and sociopolitical perspective" and, since "none of these conditions is interesting, the coincidence can hardly be used as a proposition for content analysis. In the interactions between psychiatrist and patient, an experienced expert talks with a non specialist about the problems of the latter: it cannot be assumed that their perspectives be the same." (Krippendorff, 1997).

It is obligatory to make reference here to the documental analysis, with techniques and methods related to those properly belonging to content analysis. Specialists in both subjects emphasize the differences existing between them in an attempt to outline and delimit their respective spheres of activity.

Documentary analysis appears as a subject in university courses of studies from different countries and its application extends to many fields, among which Law and History can be mentioned as examples.

The subject Documentary Analysis is taught in Argentina and Spain in Schools of Library and Information Science and Faculties and is included in the present tertiary university and non university courses of studies.

Documentary Analysis collects contributions from Linguistics and Information Science, thus it is considered to be a well known scientific discipline.

"In effect, Information Science is a Science, asserts Desantes Guanter, and in turn, it is the basis of every science since 'it is a flexible tool at the service of the sciences, up to the point of the fact that managing without it in any scientific formulation of any magnitude implies an axiomatic recess to some starting points already overcome and even modified'" (Pinto, 1991).

Basically, the difference between other types of analysis and the documentary analysis is that the latter does not allow any margin of interpretation no matter how small it may be. Another fundamental difference is that whereas the documentary analysis acts on documents, the content analysis acts on the messages contained in documents.

As a conclusion to this short presentation of Content Analysis, we could say that: "Content analysis may become one of the most important research techniques for the social sciences." (Krippendorff, 1997).

"The content analysis constitutes a pedagogical tool of unquestionable interest in the field of experimental science didactics. Different approaches and purposes are possible under this title.

We can mention the analysis of its syntactical, semantic, symbolic, curricular, evolutionary structure or degree of difficulty of contents". (Jiménez Valladares, 2001).

All the contributions to Theories of Classification can be considered from the documental point of view, precursors in the content analysis according to the data shown by Prof. Dr. Raymond Colle in the Historic bibliographical chart (Important contributions to the development of Content Analysis). We could consider the creator of the decimal classification, Melvil DEWEY ⁽¹⁸⁷⁶⁾ to be the precursor of the content analysis.

But "What is content analysis today? A set of methodological tools, more and more perfect and constantly improving, applied to "discourse" (content and form) extremely diversified. The common factor of these multiple and multiplied techniques – from the cálculo de frecuencia suministradoras de datos cifrados/calculation of frequency providing cipher data to the extraction of structures that is translated into models – is a controlled hermeneutics, based on deduction: inference." (Bardin, 1986).

We consider, however, that some of the most important functions of Content Analysis techniques and methods are the following: discovering, identifying and making recognizable the internal relationships of the different symbols existing in a message of any nature (written, oral, graphic, gestural, sonorous, visual, etc.). Yet, the important function it has when analyzing the relationships with the context must not be forgotten, understanding 'context' as the set of different personal, social, organizational environments, and the like, that may experiment some kind of influence derived from the message.

Finally, we agree with Calderero's definition of Content Analysis:

"We shall give the name Content Analysis to the set of techniques, methods or quantitative and/or qualitative proceedings that can be applied to a verbal or non verbal message, no matter how long it may be, to identify the simple elements (either formal or semantic) that constitute it and the internal relationships, either explicit or latent, among them and/or their context, this being broadly understood

as the set of personal, social, organizational environments, and the like, that may experiment some kind of influence from or in the message with the double purpose of discovering meanings that although they are present they are not recognizable by mere observation, and of allowing the possibility of making inferences.”

➔ Level of pragmatic analysis:

Pragmatics is considered among the linguistic studies as the area that studies the language in use. Studies on Pragmatics began around the 30's and was introduced by Morrison within the triad semantics, syntax and pragmatics in the field of semiotics, this being the science of the signs. It is the study of signs in relation to the speakers and the communication context.

The pragmatic analysis also studies the connection formed between the form analysis and the content analysis, at the time of assessing the textbook, in relation to and working as resource in the teaching learning processes in the author-teacher-student relationship in context.

Applying these concepts to our purposes, we establish that the pragmatic level is the one that expects to evidence the forms of connection in the teaching learning process context, about the relationship established among all the actors and in the process development where the textbook takes part and as communicating element between the formal and semantic levels of analysis. We can thus note from the textbook author's intentionality of communicating knowledge to the professional's ability to make corrections, translate or change the structures or contents. It also comprises that ideal student for whom the text was created, the teacher or teachers who select it and include it in the subject bibliography, the teacher who uses it in the classroom and transforms it into context and, lastly, the real student in the teaching learning processes and in relation to the message-medium in the sense expressed by McLuhan in the process of communication. We consider it mandatory to mention the well known approach by Mac Luhan "Message is the medium", according to which the content of the Social Means of Communication is not enough to justify its social impact. A simple observation of the social reality reveals us that the impact of the Social Means of Communication, among which we would dare include school textbooks, is not a consequence only of the nature, quality of its formal characteristic elements and its disciplinary elements, but other multiple factors intervene conditioning the processes and working from the inside of the media.

Results:

e) Detailed application to the book selected: "Histology, Embryology and Oral Tissue Engineering"

We have chosen the textbook "Histology, Embryology and Oral Tissue Engineering", 3rd Edition with CD-ROM by María Elsa Gómez de Ferraris and Antonio Campos Muñoz. It is a Histology treatise that focuses specifically on oral tissues and organs and at the same time includes interesting chapters on the study methods and techniques in histology, general and oral embryology, general histology, the clinical projection of histological knowledge and the novel techniques of tissue engineering. Hence, this is a book supported not only by the quality and wide range of content but also by the extensive use in Spanish and Portuguese speaking Universities. The authors, teachers and researchers committed to the task of teaching, offered us their textbook to use in our study.

1. Level of Formal Analysis:

Identification data of the textbook:

Title proper: Histology, Embryology and Oral Tissue Engineering.

Area or discipline: Histology. Embryology. Tissue Engineering. Odontogenesis.

Main responsibility: María Elsa Gómez de Ferraris, Antonio Campos Muñoz.

Publishing-related data:

Publishing place: México. *Publisher:* Editorial Médica Panamericana, *Date of publishing:* 2009. *Edition:* 3rd.

Physical description:

Extension: Xiv, 468 p. *Other physical details:* Il. *Size:* 28 cm. *Supplementary material:* 1 CD-ROM

Type of binding: Hardback with clinical photographs, drawings and electron microphotographs on the cover and back cover.

ISBN 978-6077743-9.

Inner structure data:

Title page: Yes.

Prologue or equivalents: Preface to the first edition. Preface to the third edition.

Introduction: No.

Acknowledgements: Yes.

Directions to the use of the textbook: In the preface.

Explanatory notes: No.

Chapter indexing: Yes (at the beginning of each chapter).

Theme or subject indexing: Alphabetical analytical subject indexing (at the end of the textbook).

List of abbreviations: Yes (at the beginning of the book).

Onomastic indexing: No.

Illustration indexing: No.

Glossaries: No.

Chapter bibliography: Yes (at the end of the book).

General bibliography: Yes (at the end of the book).

Illustrations: Tables at the end of the chapters. Diagrams. Drawings. Microphotographs.

2. Level of content analysis

It was noted that the contents in the selected textbook corresponded to the following system:

Structure

- List of abbreviations.
- Acknowledgements.
- Preface to the third edition.
- Preface of the first edition.
- Sixteen chapters.
- Bibliography.
- Analytical indexing.

As regards the scientific knowledge included, we can point out that the textbook has a first comprehensive introductory chapter defining the three important subjects the textbook is about: histology, embryology and oral tissue engineering. Likewise, it gives a historical description of the three subjects and situates them in the group of disciplines that study the human body and health. It also contains a description of methods and techniques used for studying. In the second section it presents and describes concisely the structures that compose the mouth cavity providing a global and comprehensive view. A third division includes the definition of specific histology and anatomy terms for dentistry, establishing the differences that exist with reference to other organs of the human body.

The authors' interest in orienting the histological knowledge of each chapter towards the clinical application gives the textbook an added value to the reader since it allows integrating the learning of the microscopic structure to its possible transference to pathology and the different dental therapeutics. Among the latter, the new tendencies to Regenerative Dentistry using tissue engineering techniques are extensively dealt with.

3. Level of pragmatic analysis

When using methodology in this level, we recognize and thus it is expressed in the preface, that the intellectual ones responsible for this textbook content are experienced teachers and researchers of dentistry. The text message they communicate bears the mark of its trajectory, that is to say, its personal history constructed in learning.

Also, the authors' pleasure in the teaching activity is clear when recognizing the importance of the knowledge included in its making for the dentistry professional. The knowledge they wish to communicate (tissue structures that form the mouth cavity, organs involved and the embryologic origin of them) to be applied on prevention,

diagnose and treatment is based on the dentistry practice and we corroborate that with the clinical considerations included at the end of every chapter.

Additionally, we notice the intention of producing a text corpus resorting to clarity and accuracy with the purpose of generating in students abilities, skills and dexterity integrated to a dynamic and functional context.

Regarding curriculum integration, they attempt to project and establish bridges with the rest of the dentistry disciplines.

For this purpose they make use of an additional electronic component (CD) including didactic exercises applied to the subjects that comprise the area of integrated curriculum.

It becomes evident that the authors wish the textbook to be useful and a stimulus for those who are interested in and study undergraduate and graduate dentistry, as well as reference books for dental histology and embryology in which researchers and other health professionals are interested. These wishes were verified in the wide circulation and use of the textbook in both continents, and with the constant revision of the book, of which three editions were presented in 10 years. This evolution evidences a high level of updating, incorporation of user-friendly formats that makes learning with CD ROM easier, extension of chapters destined to general histology and the incorporation of tissue engineering as the meeting point of the basic knowledge of histology and dental therapeutics.

Discussion y Conclusions:

f) Conclusions

Methodology enabled a proper application to the analysis of textbooks for dental histology and embryology and generated very useful knowledge for the teaching learning processes. Also it constitutes a tool that makes the selection of textbooks to be included in the bibliography easier. Research in education originates from problems observed in the classroom, and the transference of the results about textbook knowledge will have to be reflected in didactic strategies for teachers and students in the classroom.

Finally, in relation to analysis procedure employed, we believe it represents a novelty in the field of analysis of curriculum materials, since the principles on which they stand are simple and provide objective parameters that allow identifying, relating and comparing between the relevant aspects of the production and the use of textbooks.

It is derived from this study that textbooks are highly complex, since not only do they limit to presenting the state of a discipline but they also provide arranged information and have an organization oriented to the teaching task by providing questionnaires, activities and problems to be solved with the teacher's orientation. As pointed out by Jiménez Valladares... "The transition experimented throughout these years could be summarized in the transformation of the book that implies «content for students» into the book that implies «guide notes for teachers»."

There is also evidence of a wide variety of formats that makes comprehension difficult for students at the time of accessing contents. It is thus imperative to provide them with tools, orientation and guidance to improve the access to knowledge and thus have an effective approach to the scientific knowledge so that they may become autonomous individuals, with reflection and critical thought, develop skills that enable them to re-elaborate concepts and become active participants in the teaching process.

Likewise, as a challenge for future times, we propose the training and guidance of teachers in the design, selection and use of textbooks in an integrated relationship with the curriculum development tending to heighten the quality of teaching in our universities.

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