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BIOLOGY SCHOOL TEXTBOOKS AND THEIR ROLE FOR STUDENTS' SUCCESS IN LEARNING SCIENCES

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Abstract: What is the quality of the Romanian biology textbooks? The article gives answers to this question by watching the evolution of a textbook and by suggesting an exercise for analyzing and assessing the alternative biology textbooks. The opportunity of this analysis has been offered to students, future teachers of biology, around the time when they will directly use the textbooks for preparing and teaching the lessons. The main objective of this coordinated exercise of exploring the quality of the alternative biology textbooks is the development of the students' abilities to critically analyze the textbooks which they will use in the near future and for which they will have to express alternative options. The interests of the authors are also focused on the role of the textbooks in the learning process, on the analysis of their contribution to the students' progress in the scientific knowledge but also to their personal development. The textbook, as a source of the basic knowledge of biology as a school subject, but also as a collector of methodological ideas, is a „territory" that is insufficiently explored by students in the initial teaching preparation.

Key words: Biology, school textbooks, evaluation

1. Introduction

According to the DEX definition, (p. 598) the school subject textbook is defined as „a book which contains the basic notions of a science, art or practical pursuit" and the Robert dictionary defines it as „a didactic work that contains, in a convenient format, the essential elements of a science, techniques and especially the knowledge which is required by the scholar programmes". Gerard (2003, p 10) defines the textbook as „a printed volume, structured in order to enroll in a learning process, with the purpose of improving its efficiency. The textbook has the following characteristics: performs different functions associated with learning, serves to achieving some objectives, suggests different types of activities, likely to support the learning process."

Generally, the writing of a textbook is required by different reasons: the fact that a certain field doesn't have a textbook, the shortcomings related to the existent textbook/textbooks, changes occuring in the curriculum, the belief of the person who suggests writing another textbook that he/she can fill this lack by developing a textbook which is qualitatively superior etc.

The elaboration of a textbook requires crossing the following stages: projecting, editing, testing and evaluating the textbook. The projection of the textbook must take into consideration the target group, must mention the functions, the structure and the characteristics of the textbook (the type of the promoted learning , the types of items etc.). The drawing up of the textbook should be done in two steps: editing a chapter and editing the whole textbook. The drawn up chapter should represent a sample that reflects the author's vision regarding: the report information/ methodological knowledge, the typology of the activities suggested to the students, the quantity of exercises and problems etc. The chapter is tested in order to determine if the textbook is accessible, if it motivates students to study it, if it supports learning, if it contributes to forming a positive attitude towards that subject, if it encourages knowledge transfer, if it presents interdisciplinary openings, if it develops the critical and the scientific thinking of the students etc. After assessing and editing the chapter and the project of the whole textbook, all the chapters should be edited and the content and covers design should be set. Finally, the whole manuscript will be read by some lecturers, which are chosen from people who are specialists in this subject, didacticians, practitioners etc. and who are not involved in the elaboration of that textbook. This final lecture will be centered on the scientific correctness of the content suggested

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by the textbook, on the quality of the language and of the presentation, on the coherence of the content (the logical sequence of the knowledge and the didactic sequence). *The experimentation of the textbook can be made at a large scale, in a period of time that is longer than three months, at a limited scale orit might be missing.* The experimentation made at a large scale implies using the textbook more than three months. If the duration of the experiment is shorter than a school year, the sample of content which has the higher degree of dificulty or novelty will be chosen. This type of experimentation is practiced when the authors are at their first such an attempt, when the textbook is innovative or it is designed for a target group that belongs to a separate category. The experimentation will include a large sample of subjects from rural and urban areas, from centered or periphery schools, classes of the same type from highschools. The teachers who participate at the experimentation of the textbook will receive instructions about how to use it (a mini-guide) and an assessment grid. In the case of a limited experimentation of the textbook there are chosen a few classes (a representative sample made up of 4-6 classes) and a chosen content is partly tested. The experimentation of the textbook may be omitted when the textbook enrolls in traditional patterns (it doesn't have anything innovative in content, belief etc.), when the authors have experience in elaborating schoolbooks or when the lecturers are very competent in this field. Finally, the assessment is made on the textbook itself and on the results obtained after using it in didactic practice (Gerard & Roegiers, 2003; Segun, 1989; Ciascai, 2000).

The instruments which are most frequently used in assessing schoolbooks operate with the following categories of criteria: i) the quality of the scientific content of the textbook; ii) the quality of the didactic transposition of the scientific content; iii) the quality of the drawing up; iiii) the quality of the illustration. (Gerard & Roegiers, 2003; Segun, 1989).

In Romania, the following criteria have been applied in assessing the alternative schoolbooks: 1. The matching up with the curriculum; 2. The content; 3. The language level ; 4. The pedagogical method; 5. The presentation and the drawing up 6. The illustration; 7. The originality; 8. The quality of the materials (typographical). Each criterion is described by 2-6 factors, which have between 5 and 15 points, depending on the complexity of the criterion. The instrument (the grid) of assessment also provides the correspondence qualifier-score (Copilu, Copil, Dărăbăneanu, 2002).

2. The investigation made on a set of biology textbooks

What is the quality of the Romanian biology textbooks? The answer to this question has been developed with the participation of the third year students having the following specializations: Biology, Ecology and Environmental protection (in the academic year 2009/2010). These students attend courses of didactic module in the Department of Preparing the Didactic Staff of UBB, having the perspective of becoming biology teachers in the compulsory educational system.

The main objective of this coordinated exercise of exploring the quality of the alternative Biology textbooks is developing the students' abilities tocritically analyze the textbooks which they will use in the classroom and for which they will have to express alternative options (preferably not at random) in the future. Our interest is also focused on the role of the textbooks in the learning process, on the analysis of their contribution to the students' progress in the scientific knowledge but also in their personal development. The textbook, as a source of basic knowledges in biology as a school subject, but also as a collector of methodological ideas, is a „territory" that is insufficiently explored by students in their initial teaching preparation.

From the perspective of this study, a secondary objective – but very important in the initial teacher training - is that of deeply exploring the scientific content of the biology shool csubjects and in addition to this, the training of the abilities of discriminating between the scientific content and the content which is didactically processed. The achievement of this objective is favored by applying the criteria of assessing the scientific content, by the conscious and systematic search of the expression of a criterion/descriptor in the drawing up of the textbook.

Consecquently, the study aims at developing some capacities of operating with a set of criteria needed in assessing the textbooks :

- Decoding (explaining) and applying the quality descriptors for different categories of criteria that are present in the analysis-assessment instruments.;
- Formulating evaluative judgements which are global but also specific and transforming them into grades;
- Selectively applying the analysis and evaluation criteria depending on the specificity of the subject Biology/class/level of difficulty-complexity of the content;
- Sustaining the given grades with arguments and examples;
- Elaborating instruments for critically analyzing and evaluating the curricular supports (in group).

The subjects involved in the research were 32 students of the Faculty of Biology-Geology. The sample of subjects included a total of 28 women and 4 men. Their participation was voluntary. During 4 weeks, the subjects studied a set of 5 textbooks of biology.

In the first stage, the subjects were asked to analyze and compare 3 different textbooks, highlighting the positive and negative aspects. For example, a group of participants highlighted the following aspects:

Positive aspects:
+ A content of an average difficulty;
+ There are a lot of problems;
+ There are a lot of examples from everyday life;
+ The colours are well-chosen

Negative aspects:
- There aren't any solved problems;
- There are scientific mistakes;
- Heavy aspect;
- Some images are senseless.

In the next stage the participants were asked to identify criteria used in analyzing a schoolbook, in groups of four. At the end of the activity, which lasted 8 hours the subjects presented the criteria which were identified by each group and they finalized the following instrument:

Tabelul 1. *Aspects and criteria of analysing a school textbook*

Analyzed aspects	Categories of criteria
The scientific content	The scientific correctness; The knowledge is updated; The existence of interdisciplinary approaches.
The quality of the didactic approach proposed by the content of the textbook	The organization of the content within a theme; The accessibility of the content; The adaptability to the students' interests and needs; The clarity of the content presentation; The existence of applications and examples taken from everyday life; The offer of patterns The variety of activities; Grading the difficulty of the activities involved; There are sheets with experimental activity.
The drawing up	The organization of the textbook content at the level of themes and sub-themes (Introduction, Development, Assessment themes, Summary); The highlighting of content (underlines, highlighting with colors, the dimensions of the letters) The existence of a content; The existence of a bibliography; The existence of solutions to the problems
The illustrations	Clear illustrations; The presence of an illustration is justified; The illustrations have numbers and captions;
Others	Correct language; A language that is easily understood by students.

In the third stage the students received three sets of assessment grids of the school textbooks and they were asked to revise or complete the working instruments. The activity combined the group work with the frontal one. The principle of mentoring, namely the option for learning by cooperating in the activities of projecting the materials and the instruments for the didactic activity has been followed (Pop-Păcurar & Barna, 2004). By exchanging ideas and negotiating two grids were finalized: one for the assessment of the scientific content suggested by the textbook and the other one for the evaluation of the methodology proposed by the textbook.

Table 2. *The sheet of the evaluation of the scientific content*

Nr. crt.	Descriptors	Grades				
		INS.	SUF.	M.	G.	VG.
1.	Does the scientific content of the textbook correspond with the curriculum?					
2.	Does the content correspond with the intellectual and cognitive development of the students?					
3.	Does the knowledge presented in the textbook correspond with the students' needs?					
4.	Is the knowledge accurate, updated, various and objectively presented?					
5.	Is the knowledge presented progressively, from simple to complex and from elementary to complex?					
6.	Are the concepts adapted to the students' understanding?					
7.	Are there any practical applications?					
8.	Does the knowledge presented in the texbook facilitate formative learning?					
9.	Does the knowledge presented in the textbook contribute to the development of some values and social and moral attitudes?					
10.	Does the scientific content include interdisciplinary themes?					
	The final assessment					

Table 3. *The sheet of the evaluation of the methodology promoted by the textbook*

Nr. crt.	Descriptors	Grades				
		INS.	SUF.	A.	G.	VG.
1.	Do the learning activities facilitate learning?					
2.	Are the suggested learning activities sufficiently various?					
3.	Are the learning activities centered especially on the student?					
4.	Do the learning activities facilitate the improvement of students' knowledge through „research" : systematic observation, experiment, solving problems?					
5.	Are the suggested activities interesting for the students?					
6.	Are there any learning activities which can be used for reinforcing and systematizing knowledge?					
7.	Are there any learning activities which can serve to adjusting of knowledge?					
8.	Are the problems correlated with knowledge and with the learning activities suggested by the authors?					
9.	Are there sufficient and various problems (which can serve at controlling, assessing/self-assessing and adjusting the learning process) in the textbook?					
10.	Do the learning activities and the problems allow the students to control their cognitive progress?					
	The final assessment					

The 4th stage of our experiment aimed at the analysis of the textbooks, made on the basis of the two evaluation grids finalized by the students. Twelve of the total number of 32 students have chosen highschool textbooks (grades 9th-12th) and 20 students analyzed the Biology textbooks for grades 5th-8th – sample whose results will be presented below.

The subjects were provided with the following Biology textbooks:

Table 4. *Biology textbooks assessed by the students*

Nr.	Level	Authors	Publishing house	Number of textbooks
1	4th grade	Gheorghe Mohan, Aurel Ardelean, Aurora Mihail	All Educational, Bucharest*	**1**
2		Maria Brânduşoiu, Constanța Androne	Didactic and pedagogical Publishing House Bucharest	**9**
3	7th grade	Mihaela Marcu-Lăpădat, Florica Macovei, Floarea Dobran	Teora Educațional Bucharest	**4**
4		Zoe Partin, Luminița Logofătu, Cezar Th. Niculescu	Corint Bucharest	**3**
5	**8th grade**	**Aglaia Ionel, Victoria Oaidă**	**Humanitas Educational Bucharest**	**4**

* The grades given to this textbook have not been included in the tables.

3. The results of the evaluation made by the subjects on the textbooks

After analyzing each textbook there were given the following grades, presented at first from a global perspective: the total number of grades of a certain degree given to a particular textbook by all the evaluators, for each of the two sets of applied criteria. All 10 aspects described in the *Evaluation paper of scientific content,* respectively in the *Paper of methodological evaluation.*

The global estimations are accompanied also by explanations of the assessments that were summarized in these grades, with arguments and proper critical comments.

Table 5. The global results of the evaluation made on the Biology textbooks, using the *Evaluation paper of scientific content*

Textbook	Number of evaluation sheets	Grades obtained for the 10 aspects described in the paper (Table 2.)				
		INS.	SUF.	AV	G.	**VG.**
Biologie VI. Maria Brânduşoiu, Constanța Androne. *Editura Didactică şi Pedagogică Bucureşti*	9	-	6	19	39	**26**
Biologie VII. Mihaela Marcu-Lăpădat, Florica Macovei, Floarea Dobran. *Teora Educațional Bucureşti*	4	-	2	2	18	**18**
Biologie VII. Zoe Partin, Luminița Logofătu, Cezar Th. Niculescu. *Corint Bucureşti*	3	1	2	5	12	**10**
Biologie VIII. Aglaia Ionel, Victoria Oaidă. *Humanitas Educational Bucureşti*	**4**	**-**	**4**	**4**	**32**	**-**

It can be seen that the analyzed textbook of the six grade obtains most of the „good" grades given to the quality aspects of the scientific content of biology and to the interdisciplinary nature of its content. But there are also a lot of „very good" grades , based on the recognition of some scientific approaches at high standards.

Between the two 7th grade textbooks there is a difference which can be observed in the global data: the *Teora* textbook has more „good" and „very good" grades (the difference of one point in the number of evaluations has been taken into account). Thus, it can be considered that this textbook offers biology knowledge that is selected and presented accurately and is relevant to the needs of the students who are part of the target age group.

The 8th grade textbook is characterized by a „good" quality of the scientific content; the textbook is „consistently good" from the perspective of the 10 quality descriptors which have been applied and as well as taking into consideration its whole content (horizontal analysis). On the other hand, the students have not identified those „excellent" elements in the design of the scientific content, which in their opinion are meant to eliminate the interest for other offers.

Regarding the methodology supported by the textbooks, the global assessments are indicated in table 6:

Table 6. The global results of the assessment made on the Biology textbooks, using the *Evaluation paper of the methodology* that was suggested by the textbook

Textbook	**Number of evaluations**	Grades obtained for the 10 aspects described in the paper (Table 3.)				
		INS.	SUF.	AV.	G.	**VG.**
Biologie VI. Maria Brânduşoiu, Constanţa Androne. *Editura Didactică şi Pedagogică, Bucureşti*	9	-	14	27	31	**18**
Biologie VII. Mihaela Marcu-Lăpădat, Florica Macovei, Floarea Dobran. *Teora Educaţional, Bucureşti*	4	-	-	9	16	**15**
Biologie VII. Zoe Partin, Luminița Logofătu, Cezar Th. Niculescu. *Corint, Bucureşti*	3	2	2	3	9	**14**
Biologie VIII. **Aglaia Ionel, Victoria Oaidă.** ***Humanitas Educational, Bucureşti***	**4**	**-**	**-**	**8**	**32**	**-**

At the 6th grade there are some „sufficient" and „average" assessments, from the perspective of the didactic process of the content. This change shows that the scientific rigour of a textbook is not by itself associated with methodological elements that are meant to encourage and make efficient learning happen.

The centralization of the grades given to different aspects of the quality of the content's didactic process makes the difference between the two 7th grade textbooks even bigger. Regarding the *Corint* textbook, the learning activities and the suggested problems only partially respond to the expectations or needs of support in preparing the lessons claimed by the future teacher-students. The *Teora* textbook has 31 "good" and „very good" assessments from a total of 40 analyzed issues.

At the 8th grade there is no relevant change in the assessments' distribution for the didactic process of the textbook's content (vertical analysis of the didactic concept) in comparison to the results described above; the textbook is consistent in what we called „good quality".

In the table below we exemplify the analysis of the Biology textbooks contents and of the didactic transposition, through specific critical comments.

Table 7. Critical comments and specific examples resulting from the analysis made on the Biology textbooks

Textbook	Analyzed and assessed aspects	Grade	Comments, arguments, explanations, examples
Biologie V. Gheorghe Mohan, Aurel Ardelean, Aurora Mihail. All Educational, Bucureşti	Are there any concrete applications?	**VG**	„There are a lot of practical applications and I appreciate that the tasks are written to be understood by the 5th grade students and are not difficult to fulfil (average difficulty and resources are accessible to the students)". (Student N.P.)
	Does the scientific content include interdisciplinary themes?	**I**	„The textbook does not accomplish this criterion but it would be difficult to suggest references to subjects such as Chemistry or Physics at this level. The only example of interdisciplinary correlation can be found at the theme *Photosynthesis,* explained through schemes which include Chemistry symbols and notions. But certain references to art or traditions, to history or geography, in the study of the systematic groups of plants could be made". (Student N.P.)
	Do the suggested learning activities facilitate the learning process?	**G**	„The multitude of practical activities supports the students in assuming the scientific content. But after the „technical" discovery of the new knowledge, there is not any reflective exercise, establishing a connection of what was learned with life, environment or health." (Student N.P.)
	Do the learning activities and the problems allow the students to control their own cognitive progress?	**I**	„I could not identify metacognitive tasks which reflect on the learning manner and the self-assessment exercises are occasional, are not explicitly indicated". (Student N.P.)
Biologie VI. Maria Brânduşoiu, Constanţa Androne. *Editura Didactică şi Pedagogică Bucureşti*	Is the knowledge presented progressively from elementary to complex?	**VG**	„Yes, the knowledge is ordered from simple to complex: it starts with setting the life environment of the animals, it continues with its structure (morphology) and diversity and in the end there is an approach of the elements of evolution and the interactions with life and lifeless environment". (Student S.G.)
	Does the knowledge presented in the textbook contribute to the development of some social and moral values and attitudes?	**VG**	„Themes such as those presented in the 6th chapter contribute a lot to the development of the personal values of students in relation to the natural environment and to the shaping of moral attitudes towards it: *The effects of human activities on the animals, Our friends, the animals, A visit to the Zoo".* (Student M.P.)
	Does the scientific content include any interdisciplinary themes?	**VG**	„There are interdisciplinary references: Geography – in order to highlight the geographical distribution of the species, History- evolution, Ethology – animal behavior". (Student S.G.)
		VG	„In the content of the lessons, the Zoology notions are associated with those of Geography, Chemistry (at a simple and intuitive level) or with notions that are specific to other areas of Biology – environmental protection, anatomy and physiology. For instance, the students learn with the help of the map (protected animals in our country, chapter 6) or suggestions are made regarding some applications that refer to the percentage concentrations of the respiratory gases, oxygen and carbon dioxide (*The characteristics of the inhaled and exhaled air)". (Student M.P.)*

	Are the suggested learning activities sufficiently various?	**SUF**	„In order to understand the scientific notions the students must be involved in direct activities of discovering; in the textbook, for instance in the 2nd chapter the dissection made on alive animals , method which is no longer recommended in schools (from ethic and ecological reasons)" is excessively mentioned (Student S.G.)
		A	„Each chapter ends with cross-words! The questions and exercises are alike and repeat in a predictable way. There are no themes suggested for the individual portofolio or for projects". (Student E.Ț.)
	Are the learning activities centered especially on the student?	**G**	„The learning activities are centered on the student although they are not so various: in order to understand the notions the students must solve the tasks which were suggested in the textbook (complete missing words from texts, cross-words, questions)". (Student S.G.)
		G	„The „Good" rating was given because the textbook offers support for the learning activities centered on the student: questions, tables and text fragments that have to be completed but which are often repeated. There is a lack of problems and self-assessment exercises." (Student A.R.)
Biologie VII. Mihaela Marcu-Lăpădat, Florica Macovei, Floarea Dobran. *Teora Educațional București*	Does the scientific content presented in the textbook correspond to the curriculum?	**VG**	„The analysis curriculum-textbook demonstrated an optimal correspondence: frame-scientific content objectives". (Student C.B.)
	Does the knowledge presented in the textbook correspond to the needs of students?	**VG**	„The knowledge is accurate but also important and it awakens students' interests". (Student A.M.)
	Are the concepts adapted to the students' understanding?	**VG**	„The scientific information is completed with useful „links"; a support is given to the awareness of the knowledge importance and usefulness for a good relationship with one's own body and with the environment. For instance from the demonstration/explanation of the reflexes to the significance of the involuntary reflexes for health". (Student F.S.)
	Are there any practical applications?	**A**	„The applications are not accompanied by explanations that correspond to the level of understanding that is appropriate to 7th grade students and for this reason we assume that they are not enough. For example, the chapter *The circulatory system"*. (Student C.B.)
	Does the scientific content include any interdisciplinary themes?	**G**	„There are not any interdisciplinary themes but there are some connections; for example the description of the chemical content of food or of some optical elements in the study of eyes, transparent medium, the process of eye imaging". (Student F.S.)
		A	„The content of the lessons could allow a better interaction with other subjects but the authors have limited to what they suppose the 7th grade students have already learned according to the current curriculum". (Student A.M.)
	Do the suggested learning activities facilitate the leaning process?	**VG**	„The schemes and exercises based on schematic representations facilitate learning". (Student C.B.)
		VG	„A multitude of activity papers is presented at the end of each lesson and chapter. These activities contain problems and exercises that can help the student learn". (Student F.S.)

		VG	„The analyzed activities in this textbook are very well structured, the working tasks awaken interest, the schemes and exercises are interesting and at the same time important for the development of the student". (Student A.M.)
		G	„The student is allowed to analyze, observe, recognize, compare etc. He learns from the experiments he made by himself and not from those which are made in front of him by someone else; but this type of working can be found only in some chapters (for example chapter 3 *Annelids)". (Student M.P.)*
	Are the suggested learning activities sufficiently various?	**AV**	„The exercises are approximately of the same type, the questions have short answers, the cross-words are predominant, sometimes excessive ". (Student F.S.)
	Are the presented scientific content and the suggested activities interesting for the students ?	**G**	„The activities are interesting but based more on exercises and less on discovery". (Student A.M.)
	Do the learning activities and the problems allow the students to control their own cognitive progress?	**G**	„The number of problems and activities is small. We cannot estimate if the student can constantly assess his own progress based on them". (Student M.P.)
Biologie VII. Zoe Partin, Luminița Logofătu, Cezar Th. Niculescu. *Corint București*	Is the knowledge accurate, updated, various and objectively presented?	**G**	„The knowledge which represents the content of the textbook is accurate and varied presented; the key-notions are explained and accompanied by schemes, drawings, diagrams. The ideas, summarized at first, are developed along with the lesson". (Student C.I.)
	Is the knowledge presented progressively, from simple to complex and from elementary to complex?	**G**	„Yes, the presentation is progressive, each lesson has a main part that contains key-notions and important ideas which the student must develop as he solves the learning tasks and gains new information. The details are given gradually through schemes, drawings, examples. On the other hand, the simple-complex approach is not consistently applied". (Student G.M.)
	Are there sufficient and various problems (which can be used for the control, assessment/self-assessment and learning regulation)?	**G**	„The lessons contain tasks and problems for assessing the level of knowledge which can be estimated by the student himself, only relatively, without a score or some criteria. There are also some practical and experimental activities that can be done by the students themselves as a possible way of checking their abilities and general knowledge". (Student C.I.)
	Do the learning activities and the problems allow the student to control his own cognitive progress?	**SUF**	„Some special tasks for self-assessment are suggested only at the end of the chapter, the students being provided with the score needed for calculating the mark. The solutions of the problems are missing and therefore a talk with the teacher (at least) might be necessary in order to check the correctness of the results". (Student G.M.)

4. Conclusions and developments

The conclusions of this research can be formulated only after mentioning a frame-finding. This refers to the relation curriculum (of Biology in this case) – alternative textbook: the subjects observations are convergent in assessing what the alternative textbooks offer, at a certain level, different reflections of the (unique) curriculum. Of course, the fact is justified partly through the author's creativity, experience, scientific and didactic authority which are different. Major qualitative differences between the analyzed textbooks, from the selection of the key-notions, the adequacy of the examples or the utility of the practical activities to the graphical or illustrative editing options can be seen. And these are only a sample of the textbooks in use. This means that the effective and formative access of the

students to the scientific knowledge of biology and the opportunities (especially those that are practical) of forming the specific capacities and skills are not „equally distributed" through the offer of the textbooks. The evident conclusion is that the teacher's capacity in choosing the best textbook for his/her class becomes very important. This choice capacity is build up in time, by understanding and interiorizing the qualitative criteria and then exercising their application.

The subjects involved in the research state that after the analysis and assessment activities, they perceive a textbook in a „different" way and that they had not been aware of how important is the quality of the practical activities which were suggested in order to make the scientific content accessible. They gained a new perspective of becoming teachers, through the capacity of objectively taking into consideration the existent curricular supports, on the basis of the criteria and not of the first sight impressions.

The textbooks' potential of ensuring the students' success in Biology can develop on the one hand by reconsidering the number and content of the applications meant to stimulate independent thinking and creativity. On the other hand, we strongly recommend the diversification and improvement of the pedagogical quality of the assessment methods (in the cases where they are sporadic and repeat monotonously) in order to emphasize the development and training of the reflexive and metacognitive abilities rather than the verifications based on reproducing from memory.

The elaborate focus on the content, its density instead of the transpositions into practical learning activities, of researching and discovering and the absence of the connections with everyday life – all these, paradoxically produce an affective distance between students and the textbook, followed in time by the separation between their interests and Biology. The students involved in the research anticipate also that this situation favors elite differentiations in the classroom and moreover it becomes an obstacle for the novice teacher. Lacking in experience, he/she makes an extra effort for „rediscovering" solutions for a didactic transposition of the scientific content of the lessons.

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