Research Article

Assessment of Middle School Life And Earth Sciences Textbooks in Morocco: Teachers' Perspectives From The Rabat-Salé-Kénitra Region

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Abstract

This study evaluates the pedagogical quality, curricular coherence and didactic relevance of Life and Earth Sciences (SVT) textbooks used in Moroccan lower secondary education, with empirical evidence from the Rabat-Salé-Kénitra region. In a national context shaped by curriculum reform, competency-based learning and the growing importance of inquiry-based science education, textbooks remain a central resource for structuring classroom practices. A structured 35-item questionnaire was administered to 287 lower secondary SVT teachers. The instrument covered four complementary dimensions: disciplinary content, inquiry-based and experimental activities, organization and assessment, and linguistic and visual quality. Descriptive statistics were used to identify teachers' satisfaction levels across the evaluated indicators. The results show that scientific accuracy is generally perceived as acceptable (62% satisfaction), whereas content updating (47%) and contextualization in Moroccan learning situations (42%) remain limited. The inquiry dimension appears particularly fragile: only 38% of respondents reported the presence of a complete inquiry cycle, and ICT integration received the lowest score (29%). Although textbook organization was positively evaluated, especially chapter clarity (71%) and pedagogical progression (67%), formative assessment (34%) and competency alignment (39%) remain insufficient. Visual and linguistic quality is moderately satisfactory, but visual overload and inconsistent scientific terminology require attention. The study concludes that Moroccan SVT textbooks need a systematic revision integrating updated scientific content, feasible experimental tasks, authentic formative assessment and digital resources adapted to classroom realities.

Keywords: textbook evaluation; Life and Earth Sciences; science education; inquiry-based learning; formative assessment; Morocco.

1. Introduction

Textbooks remain one of the most influential pedagogical resources in school systems, particularly in scientific disciplines where they mediate between curriculum prescriptions, classroom practices and students' conceptual development. In Life and Earth Sciences (SVT), their role is especially important because learning requires the articulation of biological, geological and environmental knowledge with observation, modelling, experimentation and scientific explanation. A high-quality SVT textbook should therefore not merely transmit information; it should support inquiry, guide the progressive construction of concepts, facilitate formative assessment and promote scientific reasoning.

In Morocco, the textbook continues to be a central resource in lower secondary classrooms, especially in contexts where laboratory equipment, digital resources and complementary teaching materials are unevenly distributed. National reform orientations, including the Strategic Vision 2015-2030, insist on quality, equity and the renewal of pedagogical practices [1]. However, these reforms can only be translated into classroom learning when educational resources are coherent with curriculum aims, accessible to learners and operational for teachers.

The quality of science textbooks has been widely discussed in science education research. Prior work highlights the need to evaluate disciplinary accuracy, didactic transposition, inquiry structure, assessment tasks, readability, visual representations and alignment between objectives, activities and competencies [2], [3]. Recent research also stresses that textbooks can either facilitate or constrain inquiry-based science teaching depending on the way they organize problems, evidence, experiments and explanations [10], [13], [15].

Despite the strategic importance of SVT textbooks in Morocco, empirical evaluations remain limited, particularly at the lower secondary level. Existing observations suggest recurrent difficulties related to the contextualization of concepts, the feasibility of practical activities, the alignment between exercises and targeted competencies, and the integration of digital tools. These issues justify a systematic evaluation based on teachers' classroom experience.

The present study addresses this gap by evaluating officially approved middle school SVT textbooks through the perceptions of practicing teachers. The study is guided by three research questions: (1) How do SVT teachers evaluate the scientific and curricular quality of current textbooks? (2) To what extent do these textbooks support inquiry-based

and experimental learning? (3) What are the main weaknesses related to assessment, readability and visual design? By answering these questions, the article aims to provide evidence that can guide textbook revision and improve the quality of science education resources in Morocco.

2. Methodology

2.1. Research design

The study adopted a descriptive quantitative design. This design is appropriate for evaluating educational resources because it allows the identification of general trends in teachers' perceptions across several dimensions of textbook quality. The study did not aim to measure student achievement directly; rather, it examined the perceived pedagogical and didactic quality of the textbooks from the perspective of SVT teachers who use them in classroom practice.

2.2. Textbook corpus

The corpus consisted of SVT textbooks officially approved for use in Moroccan public lower secondary schools. The selected materials included the Anfass series for the first and second years, as well as the Al Massar and Al Manhal series for the third year. These textbooks were selected because of their widespread use and because they represent different editorial approaches to biological, geological and environmental content.

2.3. Study area and participants

The field survey was conducted in the Rabat-Salé-Kénitra region, which includes both urban and rural educational contexts. A total of 287 lower secondary SVT teachers participated in the study. Participants were selected through purposive sampling according to their experience with the textbooks under evaluation, their availability and their geographical distribution. The sample included teachers with professional experience ranging from 1 to 28 years; 62% of respondents were women, and 82% held a bachelor's degree in biology or a related discipline.

2.4. Data collection instrument

Data were collected using a structured questionnaire comprising 35 items distributed across four dimensions: disciplinary content rigor, methodological and experimental quality, internal organization and assessment, and linguistic, readability and visual quality. Responses were recorded on a five-point Likert scale ranging from very unsatisfactory to very satisfactory. The instrument was reviewed by a panel of seven experts in SVT didactics and piloted with 18 teachers. This procedure helped improve item clarity, content relevance and internal coherence before the main data collection phase.

2.5. Data collection procedure

Data collection took place between January and April 2025. The questionnaire was administered both face-to-face during pedagogical meetings and online through a secure digital platform. Participation was voluntary, and respondents were informed of the purpose of the study before completing the questionnaire. No identifying personal data were collected.

2.6. Data analysis

The data were analysed using descriptive statistics, including means, standard deviations, frequencies and satisfaction percentages. The analysis focused on identifying strengths and weaknesses across the four evaluation dimensions. Because the article reports aggregated survey results, interpretations are presented cautiously and are limited to the participating teachers and the regional context studied.

2.7. Ethical considerations

The study respected ethical standards for educational research. Participation was voluntary, informed consent was obtained, anonymity was guaranteed and the collected data were used exclusively for research purposes. The results are presented in aggregated form to avoid any identification of individual participants or schools.

3. Results

3.1. Disciplinary content quality

The evaluation of disciplinary content indicates an acceptable level of scientific accuracy, but it also reveals weaknesses that may affect students' conceptual understanding. Scientific accuracy obtained the highest score in this dimension (M = 3.41; 62% satisfaction), suggesting that fundamental biological and geological concepts are generally presented correctly. However, content updating remains limited (M = 2.88; 47%), which suggests that the textbooks do not always reflect recent developments in biology, geology and environmental science. Contextualization is the weakest indicator (M = 2.74; 42%), indicating that examples and learning situations are not sufficiently connected to Moroccan students' lived environment. Theory-practice articulation is moderate (M = 3.02; 55%), while the quality and precision of explanations remains satisfactory but improvable (M = 3.36; 60%).

Table 1. Evaluation of disciplinary content

Evaluated indicators	Mean	SD	Satisfaction
Scientific accuracy of concepts	3.41	0.52	62%
Content updating (biology and geology)	2.88	0.61	47%
Contextualization (examples from the Moroccan context)	2.74	0.68	42%
Theory-practice articulation	3.02	0.57	55%
Quality and precision of explanations	3.36	0.50	60%

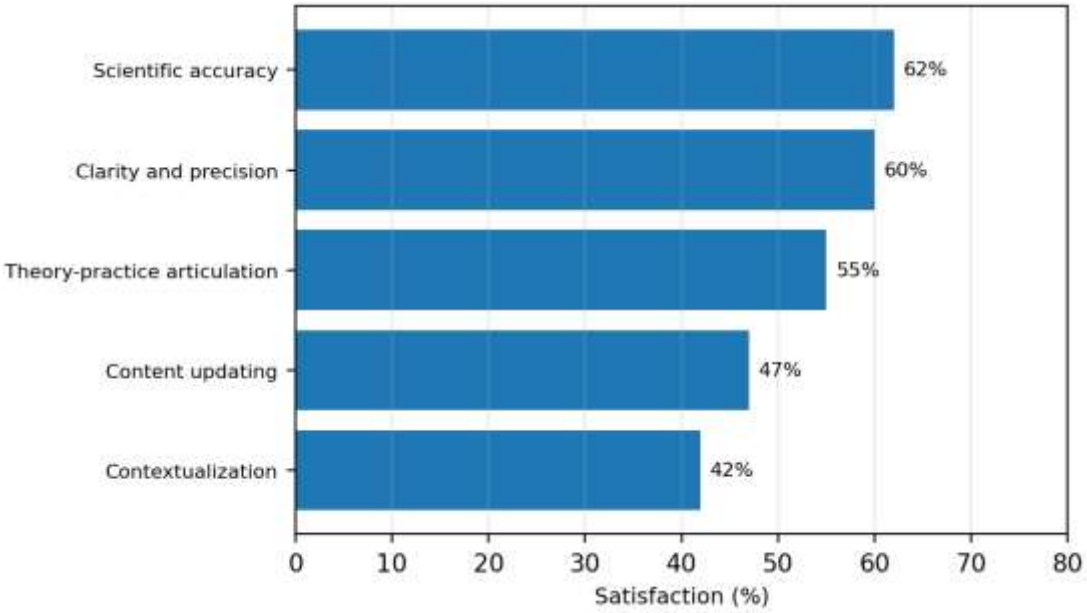


Figure 1. Teachers' satisfaction with disciplinary content indicators

3.2. Quality of inquiry-based and experimental activities

The methodological dimension reveals one of the main weaknesses of the textbooks. The complete inquiry cycle - observation, problematization, hypothesis formulation, experimentation, data analysis and conclusion - was considered satisfactory by only 38% of respondents. The variety of experimental activities also remains weak (36%), and the feasibility of experiments in ordinary classroom conditions is limited (40%). These results suggest a gap between the expected inquiry-based orientation of SVT teaching and the operational support provided by textbooks. Although observational skills are relatively better represented (58%), the integration of ICT, simulations and micrographs is particularly weak (29%). This is a critical limitation because digital tools can help represent biological and geological phenomena that are difficult to observe directly in class.

Table 2. Quality of the scientific inquiry process and activities

Indicators assessed	Mean	SD	Satisfaction
Presence of the complete inquiry process	2.94	0.63	38%
Variety of experimental activities	2.68	0.59	36%
Feasibility of experiments in class	2.72	0.65	40%
Mobilization of observational skills	3.22	0.48	58%
Integration of ICT (simulations, micrographs)	2.41	0.71	29%
Relevance of practical instructions	2.98	0.56	52%

3.3. Internal organization and assessment quality

The results show a clear contrast between the organizational quality of the textbooks and the weakness of their assessment system. Teachers expressed relatively high satisfaction with chapter clarity (71%) and pedagogical progression (67%), which indicates that the textbooks are generally well structured and easy to follow. However, the

assessment dimension is less satisfactory. Exercise diversity received only 45% satisfaction, while competency alignment reached 39%. The presence of operational formative assessment was evaluated at 34%, which is particularly problematic in a competency-based curriculum. Integrative activities also remain limited (43%), suggesting that the textbooks do not sufficiently provide complex tasks requiring students to mobilize multiple scientific skills.

Table 3. Internal organization and assessment quality

Evaluated indicators	Mean	SD	Satisfaction
Clarity of chapter organization	3.56	0.44	71%
Coherent pedagogical progression	3.48	0.46	67%
Variety of proposed exercises	2.89	0.64	45%
Alignment of exercises with competencies	2.74	0.68	39%
Presence of formative assessment	2.58	0.63	34%
Relevance of integrative activities	2.86	0.59	43%

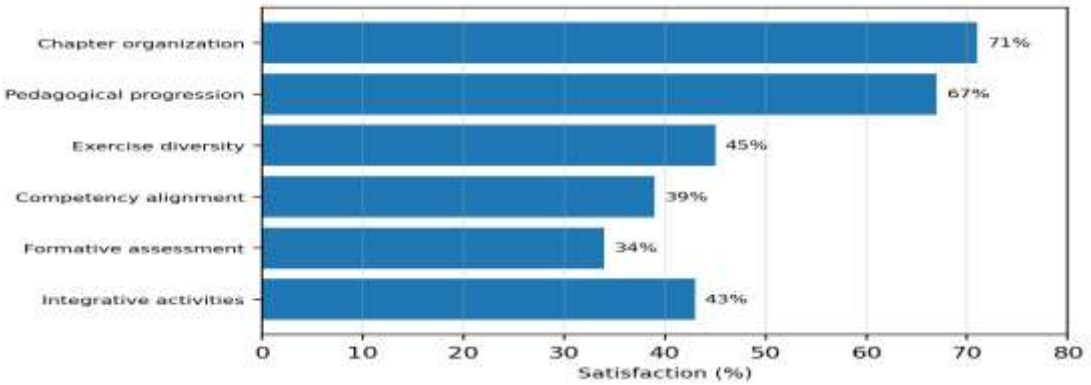


Figure 2. Organization and assessment of SVT textbooks

3.4. Linguistic readability and visual quality

The linguistic and visual dimension presents a contrasted profile. Diagrams and illustrations are the strongest element (68%), and the consistency of colours and captions is also positively evaluated (63%). These elements are essential in SVT because many biological and geological phenomena require visual mediation. Nevertheless, readability remains moderate (57%), and the precision of scientific language is evaluated at 54%. The clarity of biological and geological photographs also requires improvement (51%). The lowest indicator in this dimension is the absence of visual overload (44%), which suggests that some pages include excessive visual density, decorative elements or poorly prioritized information. Such overload may increase cognitive load and reduce students' ability to identify essential concepts.

Table 4. Linguistic and visual quality

Evaluated indicators	Mean	SD	Satisfaction
Overall readability	3.21	0.49	57%
Precision of scientific language	3.02	0.53	54%
Quality of diagrams and illustrations	3.44	0.41	68%
Consistency of colours and captions	3.32	0.47	63%
Clarity of biological photographs	2.96	0.60	51%
Absence of visual overload	2.71	0.66	44%

4. Discussion

The findings reveal a dual profile of Moroccan lower secondary SVT textbooks. On the one hand, teachers recognize their formal organization and the generally acceptable accuracy of disciplinary content. On the other hand, several didactic dimensions remain insufficiently developed, particularly inquiry-based learning, formative assessment, competency alignment, ICT integration and contextualization. This contrast indicates that the textbooks function relatively well as organized repositories of content but less effectively as tools for active scientific learning.

The weakness of contextualization is especially important in SVT education. Concepts in biology, geology and environmental science become more meaningful when they are linked to local ecosystems, health issues, environmental challenges and everyday experiences. When textbooks rely mainly on abstract or decontextualized examples, students may struggle to connect scientific knowledge to real-life situations. This limitation reduces the potential of textbooks to promote scientific literacy and problem-solving skills.

The inquiry dimension is the most critical weakness identified in the study. International research emphasizes that inquiry-based science education requires more than the presence of experiments; it requires coherent learning sequences that engage students in asking questions, formulating hypotheses, collecting evidence, interpreting data and constructing explanations [10], [13], [15]. The low satisfaction scores for complete inquiry sequences, experimental diversity and feasibility suggest that Moroccan SVT textbooks require deeper didactic engineering. Practical activities should be designed according to classroom realities, available materials and progressive student autonomy.

The assessment results also raise an important issue. In a competency-based curriculum, assessment should not be limited to end-of-chapter exercises or recall questions. It should include formative tasks that help teachers diagnose learning difficulties, regulate instruction and guide students toward scientific reasoning. The low satisfaction rates for formative assessment and competency alignment indicate that textbook revision should focus on constructing assessment tasks that are coherent with learning objectives, inquiry activities and expected competencies [3].

The visual dimension constitutes both a strength and a challenge. Diagrams and illustrations are appreciated, which confirms their importance in SVT learning. However, visual overload can interfere with comprehension when pages contain too many competing elements or when the hierarchy of information is unclear. Improving textbook design therefore requires a balance between rich iconography and cognitive accessibility. Clear captions, readable layouts, high-resolution photographs and consistent terminology are essential for effective scientific communication.

Compared with international orientations in science education, the results suggest that Moroccan textbooks need to move from a mainly descriptive model toward a more inquiry-oriented and competency-based model. Countries with strong science education systems increasingly treat textbooks as flexible learning resources that combine conceptual structuring, authentic problems, experimental tasks, digital simulations and formative assessment [4], [5], [7]. For Morocco, this implies closer collaboration between curriculum designers, researchers in science education, textbook authors, inspectors and classroom teachers.

The study contributes to the literature by providing an integrated empirical evaluation of SVT textbooks through four complementary dimensions. It also offers practical evidence for curriculum developers and publishers. However, the results should be interpreted with caution because the study is based on teachers' perceptions in one region and does not include direct classroom observation or student achievement data. Future research should combine teacher surveys with systematic textbook content analysis, classroom observations and learner performance measures.

5. Conclusion

This study shows that Moroccan middle school SVT textbooks possess a solid organizational structure and an acceptable disciplinary foundation, but they remain insufficiently aligned with the requirements of contemporary science education. Their main weaknesses concern the limited integration of complete inquiry sequences, the insufficient diversity and feasibility of experimental tasks, weak formative assessment, limited competency alignment, insufficient contextualization and underdeveloped digital integration. To meet international quality expectations and support national educational reform, future textbook revision should prioritize updated scientific content, local contextualization, classroom-feasible experiments, progressive inquiry-based activities, high-quality visual resources and authentic formative assessment. Strengthening these dimensions would contribute to improving textbook quality and supporting more effective, meaningful and equitable SVT learning in Moroccan lower secondary education.

6. Practical recommendations for textbook revision

1. Update disciplinary content regularly to reflect recent developments in biology, geology and environmental education.
2. Integrate Moroccan contextual examples related to health, environment, biodiversity, natural risks and local ecosystems.
3. Redesign experimental activities so that they are feasible in ordinary classrooms and require progressive student participation.
4. Include complete inquiry sequences connecting observation, questioning, hypothesis, experimentation, data interpretation and conclusion.

5. Strengthen formative assessment by adding diagnostic tasks, feedback-oriented exercises and competency-based integrative activities.
6. Improve visual design by reducing overload, clarifying captions, standardizing terminology and using high-resolution scientific photographs.
7. Add digital extensions such as simulations, QR-linked resources, micrographs and interactive models aligned with textbook activities.

7. Limitations and future research

The study has three main limitations. First, it relies on teachers' perceptions and therefore does not directly measure student learning outcomes. Second, the field survey was conducted in the Rabat-Salé-Kénitra region, which limits the generalization of results to all Moroccan regions. Third, the study did not include a detailed page-by-page content analysis of each textbook. Future research should combine survey data with classroom observations, student performance measures and systematic textbook coding in order to provide a more comprehensive evaluation of SVT textbook quality.

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