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Teaching Life and Earth Sciences in the Zinder I General Secondary Education Inspectorate: Challenges and Possible Solutions

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Abstract

Teaching Life and Earth Sciences (LES) contributes to students' scientific literacy, understanding of natural phenomena and development of critical thinking. However, its implementation in secondary schools may be constrained by pedagogical and institutional factors. This article examines the difficulties faced by LES teachers in the Zinder I General Secondary Education Inspectorate in Niger and identifies possible improvement strategies. The study draws on a survey conducted between November and December 2025 with 14 teachers from three schools, two public and one private, supplemented by documentary research, interviews with pedagogical support staff and direct observation. Data were processed using Excel and analysed descriptively. Findings show that 64.29% of surveyed teachers reported not having received initial teacher training, that professional backgrounds were heterogeneous, and that facilities for practical work were insufficient in two of the three schools. The article recommends strengthening initial and in-service teacher education, improving pedagogical support, gradually equipping schools, and promoting practical activities using locally available resources. Given the small, purposively selected sample, findings describe the study setting and should not be generalised to all secondary schools in Niger.

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Introduction

Science education plays an important role in students' intellectual development and preparation for citizenship. Life and Earth Sciences (LES) address biological, geological, environmental, and health-related phenomena by linking observation, questioning, hypothesis formulation, and the interpretation of results. Learning in this subject should therefore go beyond memorising concepts: it should also help students develop scientific reasoning and apply knowledge to understand real-life situations.

This ambition nevertheless depends on the conditions under which teaching is organised. Mastery of subject content, understanding students' conceptions and difficulties, the teaching methods used, the availability of instructional materials, and the existence of practical-work spaces are all factors that may influence learning. Where resources are limited, teachers often have to reconcile curriculum requirements with inadequate material and institutional support.

In Niger, challenges in secondary education form part of the broader issue of access, equity, and educational

quality. Studies and documents cited in the dissertation from which this article derives highlight issues relating to teacher training, the diversity of teachers' professional backgrounds, inadequate teaching resources, and a lack of scientific infrastructure (AFTHD & World Bank, 2007; De Ketele, 2014; Moussa Mohamed Sagayar, 2011). The national figures cited in the dissertation relate to earlier years and should be interpreted as historical contextual information, not as a description of the current statistical situation.

In the Zinder I General Secondary Education Inspectorate (IESG/Zr I), the reported difficulties include lesson preparation, initial and in-service teacher training, diverse professional backgrounds, and access to infrastructure needed for experimental activities. These constraints are particularly important in LES, where observing phenomena, handling equipment, and using representations help make concepts more accessible.

The overall aim of this study is to analyse difficulties associated with teaching LES in the IESG/Zr I and to propose possible solutions. Three specific objectives follow: to identify the pedagogical difficulties encountered by teachers; to describe institutional and material constraints; and to propose measures that could improve the quality of teaching and learning. The central research question is: What are the main difficulties encountered in teaching LES in the selected schools, and what pedagogical and institutional approaches could help reduce them?

The article first presents insights from the literature and the theoretical framework, followed by the methodology, results, discussion, and recommendations. It draws on the data documented in the source dissertation and does not add undocumented field data.

Teacher Training and the Quality of Learning

Teacher training is an important driver of professionalisation. It involves more than mastery of subject knowledge: it also includes knowledge of learners, curricula, teaching approaches, assessment, and the conditions required to transform knowledge into teachable content. Initial teacher education should provide academic, psycho-pedagogical, and didactic knowledge, while continuing professional development helps update and deepen teachers' skills throughout their careers.

In the source dissertation, initial teacher education is defined as an organised set of learning experiences completed before entry into professional life. Continuing professional development refers to activities designed to strengthen knowledge and abilities after initial training. These two dimensions complement each other: initial training establishes the foundations of professional practice, while continuing development supports adaptation to curriculum changes, classroom difficulties, and new teaching practices.

De Ketele (2014) is cited in the dissertation to emphasise the role of teacher training and professionalisation in the effectiveness of education systems. Compaoré (1996), also cited in the dissertation, examines the influence of initial teacher training on academic achievement. These references suggest that training is an important condition, without implying that it alone explains educational outcomes, which also depend on resources, class sizes, family environments, curricula, and learning conditions.

Pedagogical Content Knowledge in Science Teaching

Shulman (1986) introduced the concept of pedagogical content knowledge (PCK), which refers to the relationship between knowledge of a subject and the ability to make that knowledge understandable to learners. A teacher may master concepts in biology or geology without necessarily knowing which representations to use, which misconceptions to anticipate, which activities to propose, or how to connect an abstract concept with students' experience. Professional competence therefore involves a considered transformation of knowledge into teachable content. Magnusson, Krajcik, and Borko (1999) developed this perspective further in the field of science teaching. The model presented in the dissertation emphasises the goals of science teaching, teaching strategies, representations of content, knowledge of students, and knowledge of the curriculum. It also highlights the importance of inquiry-based practices and the relationship between the theoretical and experimental dimensions of scientific knowledge.

Applied to LES, this approach suggests examining not only teachers' qualifications but also their ability to design simple experiments, use samples and observations, work with diagrams and images, encourage students to formulate hypotheses, and guide them in interpreting results. Equipment availability matters, but didactic choices and the ability to adapt activities to the local context are also decisive.

Joint Action in Didactics

The theory of joint action in didactics, developed notably by Sensevy, examines interactions among the teacher, students, and knowledge. It views learning as taking shape through activity organised around content within a given didactic environment. The dissertation also draws on Brousseau's (1986, 1988) concepts of the didactic contract and the didactic milieu.

The didactic contract refers to the explicit or implicit expectations that structure the responsibilities of teachers and students; the didactic milieu comprises the objects, resources, and situations that make work on knowledge possible.

In LES teaching, these concepts remind us that learning does not depend solely on the oral presentation of a lesson. It also develops through assigned tasks, questions, observed objects, practical activities, exchanges, and feedback. When the learning environment lacks both a laboratory and suitable equipment, the range of inquiry-based situations may be reduced. Teachers can nevertheless draw on nearby resources, field observations, diagrams, photographs, or simple demonstrations, provided that these adaptations are scientifically relevant and safe.

Institutional Constraints and Teaching Resources

Institutional conditions include infrastructure, equipment, textbooks, visual aids, workspaces, and pedagogical support mechanisms. Historical data cited in the dissertation highlight shortages of school equipment in Niger, but these data should not be mistaken for a comprehensive assessment of the current situation.

At the local level, the study examines the availability of laboratories, computer rooms, and libraries in three schools.

The mere existence of equipment does not guarantee its pedagogical use. Equipment must also be functional, accessible, maintained, and suited to curriculum objectives, and teachers must have the time and skills needed to prepare lessons. Conversely, the absence of a laboratory does not necessarily rule out all practical learning: some observations and activities can be carried out using local resources while respecting safety requirements. Such alternatives are, however, adaptive measures and cannot provide a lasting substitute for appropriate scientific infrastructure.

Materials and Methods

Study Design and Setting

This is a descriptive study of difficulties encountered in teaching LES within the Zinder I General Secondary Education Inspectorate, in the Zinder region of Niger. It combines descriptive quantitative data from a questionnaire with qualitative information collected through interviews, observation, and documentary research. This combination aims to describe teachers' characteristics, their working conditions, and the resources available in the selected schools.

The IESG/Zr I supervises public and private general secondary schools. The dissertation states that it covers 20 schools, including 10 public and 10 private institutions, and reports institutional figures drawn from documents consulted by the author. These contextual data are not used here as updated national statistics. Fieldwork focused on three schools: LAKD and CEG18, both public, and CSP Trophée, a private school.

Population and Sampling

The sample comprised 14 LES teachers selected through purposive sampling because of their direct involvement in the subject under study. Eight teachers came from LAKD, three from CEG18, and three from CSP Trophée. The sample included 11 men (78.57%) and three women (21.43%). It is a small, targeted sample: the findings identify trends in the schools surveyed but do not support statistical generalisation to all LES teachers in Zinder or Niger.

Data Collection Techniques and Instruments

The dissertation identifies four techniques: documentary research, a questionnaire, interviews, and direct observation. The questionnaire administered to teachers addressed pedagogical difficulties, institutional constraints, and proposed solutions. Two interview guides were developed, one for pedagogical inspectors and the other for pedagogical advisers. The preliminary survey took place from 3 to 9 November 2025 and involved inspectorate officials, particularly those responsible for human resources, statistics, and infrastructure. The main survey was conducted in the three schools from 16 November to 16 December 2025.

The documentary review covered books, articles, dissertations, theses, and institutional documents relating

to teacher training, science didactics, and the Nigerien educational context. Direct observation aimed to gather information about working conditions and available resources. However, the dissertation does not provide full interview transcripts, verbatim statements from participants, or a detailed observation grid; consequently, this article cannot present direct quotations or detailed qualitative findings that are absent from the source document.

Data Processing and Analysis

The questionnaires were processed using Microsoft Excel. The analysis mainly involved calculating frequencies and percentages and presenting the results in tables or figures. Interview and observation data were used to complement the descriptive analysis, but the dissertation does not describe a systematic qualitative coding protocol. The analysis presented here therefore prioritises figures explicitly reported and observations documented in the dissertation.

Ethical Considerations and Methodological Limitations

The dissertation reports that administrative authorisation was sought for data collection, but it does not specify the procedures for individual consent, anonymisation of responses, or possible approval by an ethics committee. Such information cannot be added retrospectively without confirmation from the author. Before submission to a scientific journal, the author should clarify—if these procedures were indeed followed—how participants were informed, how consent and confidentiality were ensured, and how data were stored. Several limitations must be acknowledged: the small sample; the purposive selection of three schools; the predominance of male participants; the lack of systematic observation of classroom interactions, as noted in the dissertation; and the limited qualitative data presented. In addition, some institutional information in the dissertation is outdated or contains inconsistencies in its wording. The findings are therefore interpreted cautiously and should not be treated as a comprehensive assessment of LES teaching across the region.

Results and Discussion

Teachers' Sociodemographic Profile

The 14 teachers interviewed varied in age and professional background. The dissertation indicates that the 44–49 age group was the largest, with four teachers (approximately 29%). The 34–39 and 39–44 age groups included three and two teachers, respectively, according to the dissertation; the other age groups were less represented.

The sample was predominantly male: 11 men (78.57%) and three women (21.43%).

This profile describes only the sample selected. It does not show that the LES teaching profession in Zinder is generally male-dominated or that age determines pedagogical practices. It nevertheless provides an overview of the professionals whose difficulties were documented.

Heterogeneity of Professional Backgrounds

The teachers' educational backgrounds varied. Of the 14 teachers, three held the MPPES and two the CAPES. The remaining nine had diverse qualifications or training pathways, including biochemistry, agronomy, natural sciences, psychology, nutrition, laboratory studies, social work, and midwifery.

This diversity suggests that several teachers working in LES may not have followed a training pathway specifically designed for teachers of this subject.

Professional status was distributed as follows: nine permanent teachers (64%), four contract teachers (29%), and one participant in the national civic service programme (7%). Status alone does not directly indicate teaching quality; rather, it is contextual information that should be considered alongside training, experience, support, and working conditions.

Reasons for Entering the Teaching Profession

Responses about career choice fell into three categories. Five teachers (35.71%) said they had chosen teaching out of vocation; another five (35.71%) cited employment needs; and four (28.58%) mentioned fear of unemployment. These findings show that motivations varied within the surveyed group.

These data do not establish a causal relationship between motivation and teaching effectiveness. They do, however, indicate that professionalisation cannot rely on recruitment alone: it must also include support enabling every teacher to develop subject-specific, didactic, and psycho-pedagogical skills.

Initial Teacher Education and Continuing Professional Development

The most notable finding concerns initial teacher education: nine of the 14 teachers (64.29%) reported that they had not received it, while five (35.71%) said that they had. Regarding continuing professional development, nine teachers (64.29%) reported having received such training, while five (35.71%) said they had not.

The coexistence of an initial-training gap affecting most respondents and reported participation in continuing professional development by nearly two-thirds highlights the need to distinguish between these two arrangements. Continuing professional development can support teaching practice, but it should not automatically be regarded as a complete substitute for structured initial teacher education. The dissertation does not specify the duration, frequency, content, or assessment of the continuing training undertaken; its effectiveness therefore cannot be measured from the available data alone.

Availability of Facilities for Practical Work

The inventory of facilities in the three schools reveals an unequal situation. According to the table presented in the dissertation, LAKD has a laboratory, a computer room, and a library. CSP Trophée has none of these three facilities. CEG18 has neither a laboratory nor a computer room, but it does have a library.

Thus, only one of the three schools has all three facilities listed. Two schools lack both a laboratory and a computer room; one of these has a library, while the other has none of the three facilities. This situation suggests that opportunities for practical work and access to digital resources differ considerably between schools.

The data concern the reported presence of facilities, not their condition, capacity, level of equipment, or frequency of use. They therefore do not establish whether the LAKD laboratory is fully operational or whether the libraries contain up-to-date resources. Nevertheless, they indicate inadequate facilities in two of the three schools studied.

Summary of Findings in Relation to the Hypotheses

The data support the first descriptive hypothesis: within the sample, professional backgrounds are heterogeneous and most respondents report having received no initial teacher training. The finding on continuing professional development is more nuanced, since nine of the 14 teachers reported having received it. It would therefore be excessive to claim that continuing training is absent; the issue concerns its coverage, relevance, and ability to meet actual needs.

The second hypothesis is supported by the facilities inventory: two of the three schools have neither a laboratory nor a computer room, and only one has all three facilities listed. The third hypothesis is supported at the level of proposed measures, but their effectiveness has not been experimentally assessed. Recommendations concerning training, support, and the adaptation of activities should therefore be understood as proposals to be tested, not as interventions whose impact has already been demonstrated.

Initial Teacher Education as a Professionalisation Challenge

The finding that nine out of 14 teachers reported receiving no initial teacher training is an important result of this survey. It reflects the professionalisation issue discussed in the dissertation and concerns about the diversity of professional backgrounds in secondary education. The point is not to assume that a teacher trained in another field is necessarily ineffective, but to recognise that teaching requires specific skills that do not automatically follow from mastery of a subject area.

Shulman's (1986) concept of pedagogical content knowledge helps clarify this distinction. Teaching genetics, geology, or biology requires knowledge of scientific concepts, but also the ability to anticipate misconceptions, select appropriate representations, and build a suitable learning progression.

In science education, Magnusson *et al.,* (1999) emphasise the complementary roles of knowledge of students, curriculum knowledge, teaching strategies, and representations of content. These dimensions are particularly important when concepts cannot be observed directly or require models and experiments.

The data on professional motivation add context without justifying judgements about individuals. A sense of vocation, the need for employment, and fear of unemployment may coexist in professional trajectories.

Table.1 Sample distribution by school and sex.

Schools	Men	Women	Total
LAKD	6	2	8
CEG18	2	1	3
CSP Trophée	3	0	3
Total	11	3	14

Source: Field survey, November–December 2025.

Table.2 Initial Teacher Education and Continuing Professional Development

Dimension	Response	Frequency	Percentage
Initial teacher education	Yes	5	35,71 %
Initial teacher education	No	9	64,29 %
Continuing professional development	Yes	9	64,29 %
Continuing professional development	No	5	35,71 %

Source: Field survey, November–December 2025.

Table.3 Facilities reported in the schools surveyed

School	Laboratory	Computer room	Library
LAKD	Yes	Yes	Yes
CSP Trophée	No	No	No
CEG18	No	No	Yes

Source: Field survey, November–December 2025.

The institutional challenge is to provide all teachers, regardless of their reasons for entering the profession, with coherent professional support and regular opportunities to develop their skills.

Continuing Professional Development: An Opportunity and a Condition for Effectiveness

The fact that 64.29% of respondents reported having undertaken continuing professional development can be viewed as a useful starting point. However, the existence of training does not in itself establish its relevance or effects. To be useful, continuing development should address needs observed in classrooms, include practical activities, encourage collective analysis of lessons, and be followed by ongoing support. Occasional, exclusively theoretical training may have limited effects if teachers subsequently lack the resources needed to apply what they have learned.

In this regard, pedagogical development groups, classroom visits, demonstration sessions, communities of practice among LES teachers, and exchanges with pedagogical advisers could strengthen the transfer of professional learning into practice. The aim would be to bring training closer to lesson planning, experimentation, student assessment, and reflection on difficulties encountered.

Infrastructure as a Condition for Scientific Inquiry

The findings on equipment show inequalities among the three schools. This matters because LES draws on theoretical knowledge, observation, and practical activities. The theory of joint action in didactics helps explain this point: the didactic milieu, comprising objects, materials, and working situations, shapes the actions available to teachers and students. A resource-poor environment limits some opportunities for inquiry, even though teachers can adapt their approaches.

Nevertheless, material determinism should be avoided. The presence of a laboratory does not by itself ensure active pedagogy; conversely, observational activities can be organised without a specialised laboratory, using natural objects, safe samples, nearby field sites, photographs, diagrams, or audiovisual resources. The key issue is coherence between the learning objective, the chosen resource, safety, and the reasoning process expected of students.

Local alternatives include designing teaching materials from available resources, using diagrams, texts, photographs, and videos, and adapting certain practical activities. These are pragmatic solutions, but they should not become a permanent justification for inadequate equipment. A sustainable policy must combine such adaptations with gradual investment in functional laboratories, libraries, and computer equipment.

An Approach Combining Pedagogical and Institutional Dimensions

One contribution of this study is to show that the difficulties do not have a single cause. Teacher training, professional backgrounds, material resources, and opportunities for support interact. Asking teachers to organise more experimental activities without providing equipment or preparation time may be unrealistic. Conversely, building a laboratory without training teachers to prepare, conduct, and use practical work may limit the use of that equipment.

A coherent strategy should therefore operate at three levels. At the individual level, teachers' subject knowledge and didactic skills should be strengthened. At school level, equipment should be made available, maintained, and shared where appropriate, and time should be set aside for collaborative preparation. At institutional level, authorities should support training, pedagogical visits, resource development, and planned investment.

This approach reflects the dissertation's general argument that pedagogical and institutional conditions influence the quality of LES teaching.

Scope and Limitations of the Findings

The findings must be interpreted in light of the research design. A sample of 14 teachers from three schools cannot provide a precise estimate of the prevalence of difficulties across the entire inspectorate, nor can it establish a statistical relationship between training, equipment, and student achievement. The study presents no student performance data and does not directly measure the effects of teaching practices.

Furthermore, equipment availability was recorded as a binary measure and provides no information about condition or actual use. The data on continuing professional development do not specify the content of the training received. Finally, the dissertation notes that classroom interactions were not observed in depth. Future research could use a larger sample and combine classroom observations, transcribed interviews, analysis of teaching materials, and data on student learning. Such an approach would provide a better understanding of how the identified conditions translate into everyday practice.

In conclusion, this study aimed to analyse difficulties associated with teaching Life and Earth Sciences in the Zinder I General Secondary Education Inspectorate and to propose possible solutions. The survey of 14 teachers in three schools identified two broad sets of constraints: pedagogical difficulties associated with heterogeneous professional backgrounds and initial teacher education, and institutional difficulties linked to inadequate facilities for practical work.

The findings indicate that nine out of 14 teachers (64.29%) reported having received no initial teacher training, while nine (64.29%) reported having participated in continuing professional development.

Teachers' educational backgrounds varied, and their reasons for entering the profession included vocation, employment needs, and fear of unemployment. In terms of facilities, only one of the three schools studied had a laboratory, a computer room, and a library; two schools had neither a laboratory nor a computer room.

These findings support the view that improving LES teaching requires coordinated action on teacher professionalisation and the learning environment. Initial teacher education needs to be strengthened, continuing professional development should be more regular and responsive to teachers' needs, pedagogical support should be improved, and the gradual provision of equipment should be planned. Activities adapted to locally available resources can complement these measures, provided that scientific standards and safety requirements are respected.

The scope of the findings remains limited by the small, purposively selected sample, the absence of systematic classroom observations, and the lack of measures of student learning. The conclusions should therefore be treated as local findings and avenues for further investigation. Future research involving a larger sample, classroom observations, and data on student achievement would help assess the relationships between teacher training, facilities, and the quality of LES teaching and learning.

References

AFTHD, & World Bank. (2007). At the crossroads: Choices for secondary education and training in Sub-Saharan Africa. World Bank.

Brousseau, G. (1986). Foundations and methods of mathematics didactics. Recherches en didactique des mathématiques, 7(2), 33–115.

Brousseau, G. (1988). The didactic contract: The milieu. Recherches en didactique des mathématiques, 9(3), 309–336.

Compaoré, G. (1996). The influence of initial teacher training on students' academic achievement: The case of teachers trained at ENEP and student success in the primary school certificate examination in Burkina Faso [Master's dissertation in education sciences].

De Ketele, J.-M. (2014). Reference on teacher training and professionalisation cited in the source dissertation. Full bibliographic details should be verified before submission.

Durkheim, É. (1938). The educational evolution in France. Presses universitaires de France.

Legendre, R. (1993). Current dictionary of education. ESKA.

Mace, G. (1991). Guide to developing a research project. De Boeck Université.

Magnusson, S., Krajcik, J., & Borko, H. (1999). Nature, sources, and development of pedagogical content knowledge for science teaching. In J. Gess-Newsome & N. G. Lederman (Eds.), Examining pedagogical content knowledge: The construct and its implications for science education (pp. 95–132). Kluwer Academic Publishers.

Mialaret, G. (1979). Vocabulary of education. Presses universitaires de France.

Moussa Mohamed Sagayar. (2011). Teacher action and training practices: Analyses in preparatory classes and in a pedagogical development group in Niger [Doctoral thesis in education sciences, Université Rennes 2 and Université Abdou Moumouni].

Republic of Niger. (1998). Law No. 98-12 of 1 June 1998 on the orientation of the Nigerien education system (LOSEN).

Sensevy, G. (2011). The meaning of knowledge: Elements for a theory of joint action in didactics. De Boeck.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. Educational Researcher, 15(2), 4–14.

Tchagnaou, A. (2008). Initial teacher training and its impact on schools' internal efficiency: The case of CEG Bè-Klikamé and CEG Bè-Attikpa Kagounou in Lomé [Master's dissertation in education sciences, University of Lomé].

Tchagnaou, A. (2021). How to successfully complete a dissertation or thesis. Éditions Gashingo.

Tchagnaou, A. (2021). Parallels between scholarly teachers and pedagogical teachers. Revue Della Afrique, special issue, 367–378.

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