

TEACHING TASKS ON GEOGRAPHIC COORDINATES: THEIR IMPACT ON SPATIAL LOCATION

TAREAS DOCENTES SOBRE COORDENADAS GEOGRÁFICAS. SU IMPACTO EN LA LOCALIZACIÓN ESPACIAL

Januário Cacilda André. Januario1973@gmail.com. Instituto Superior Ciencias de la Educación, Sumbe, Angola. ORCID: <https://orcid.org/0000-0001-8892-2576>

Metade João Neto. marcellometade90@gmail.com. Instituto Superior Ciencias de la Educación, Sumbe, Angola. ORCID <https://orcid.org/0009-0005-7126-9159>

**Corresponding author:* Januario1973@gmail.com

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ABSTRACT

This research emerged as a response to shortcomings identified by Geography teachers at the «Soba Kapungo» School Complex in Cuanza-Sul Province, Angola, related to methodological preparation for addressing the content on geographic coordinates. These shortcomings have negatively influenced the teaching-learning process of students, particularly in mastering the knowledge elements of longitude and latitude. As a solution to this problem, the development of a system of teaching tasks on geographic coordinates was proposed to contribute to spatial location through the teaching-learning process of the Geography subject in the seventh grade at the aforementioned school complex. For the development of the research, theoretical, empirical, and statistical methods were used, such as analysis-synthesis, inductive-deductive method, application of surveys and interviews, as well as a percentage analysis of data extracted from reports and other documentary sources. This study represents a practical contribution that strengthens teachers' methodological performance and facilitates students' appropriation of the content. The implementation of the proposal demonstrates its feasibility, and the results reveal positive indicators regarding the relevance of the teaching tasks.

KEYWORDS: teaching-learning process; instruction and education; development of geographical reasoning; latitude; longitude

RESUMEN

Esta investigación surgió como respuesta a insuficiencias identificadas por los profesores de Geografía del Complejo Escolar «Soba Kapungo», de la provincia de Cuanza-Sul en Angola, relacionadas con la preparación metodológica para el tratamiento de los contenidos sobre coordenadas geográficas. Estas insuficiencias han influido de forma negativa en el proceso de enseñanza-aprendizaje de los alumnos, particularmente en el dominio de los elementos del conocimiento: longitud y latitud. Como solución a este problema, se propuso la elaboración de un sistema de tareas docentes sobre coordenadas geográficas para contribuir a la localización espacial, mediante el proceso de enseñanza aprendizaje de la asignatura Geografía en séptimo grado en el referido complejo escolar. Para el desarrollo de la investigación se utilizaron métodos de nivel teórico, empírico y estadístico, tales como: análisis-síntesis, método inductivo-deductivo, aplicación de encuestas y entrevistas, así como un análisis porcentual de datos extraídos de informes y otras fuentes documentales. Este estudio representa una contribución práctica que fortalece el desempeño metodológico de los docentes y facilita la apropiación de los contenidos por parte de los alumnos. La implementación de la propuesta demuestra su viabilidad y los resultados revelan indicadores positivos en cuanto a la pertinencia de las tareas docentes.

PALABRAS CLAVE: proceso enseñanza-aprendizaje; instrucción y educación; desarrollo del razonamiento geográfico; latitud; longitud

INTRODUCTION

Angolan higher education institutions are immersed in the reform of their structures and working methods. One of their objectives is to ensure that professional training is contextualized, which requires a change in training plans based on the transformation of teaching environments, involving changes in objectives, forms of organization, methods, means and evaluation forms as fundamental components of the teaching-learning process.

Básica–Brasília (2017) pointed out that Geography teaching practice must go beyond the description of facts and information, as well as abstraction, concepts and abstract memory. Geography teaching should enable new ways of seeing and understanding the world, in a more global and critical manner regarding the relationships that shape reality (de Souza et al., 2025); only then students understand and transform the complex socio-spatial relationships that configure reality, rather than limiting themselves to repeating information disconnected from their context.

For this critical and transformative vision to materialize in the classroom, pedagogical practice must be structured based on activities that link content with the student's reality. In this sense, teaching tasks acquire a central role, as they allow overcoming the transmission of information and fostering meaningful and contextualized learning.

Teaching tasks are of great value in the teaching-learning process of all subjects. They help students become motivated to learn new knowledge and to evaluate their progress. According to Zabala (2000), the task is a strategy that must be directly articulated with learning objectives, enabling the student to understand, apply and transfer knowledge to different contexts. From a methodological standpoint, Libâneo (2015) states that tasks contribute to student motivation, the development of meaningful learning, and facilitate the continuous evaluation of student progress.

Several authors such as de Zayas (1999); Silvestre (1999); Fuentes (2000); Bolívar (2009); Hernández et al. (2000); Zilberstein & Olmedo (2015); among others, identify the task as a means to direct and promote student learning. According to de Zayas (1999), the teaching task is understood as the cell of the teaching-learning process; it is the action of the teacher and the students within the process that is carried out under certain pedagogical circumstances, with the purpose of achieving an objective. It is the link that unites the teacher's activity with that of the student.

Teaching tasks have extraordinary importance because they allow the relationship between theory and practice and comprehensive development by fostering study habits, responsibility, perseverance and self-management of knowledge. They contribute to addressing individual differences by facilitating work with personalized student performance levels and are fundamental for consolidating prior content and evaluating the quality of learning.

Teaching geographic coordinates through teaching tasks is fundamental for developing location skills. It allows precise location of points by situating any point on Earth using the imaginary grid of latitude and longitude. It is essential for orientation through the interpretation of maps, globes and plans. It contributes to students' spatial location by facilitating the understanding of the position of their local, national and global environment.

This active approach to developing teaching tasks facilitates learning through problem-solving based on the environment and interpreting geographic information in real-life contexts to analyze current phenomena. By working with geographic representation, students connect content with experience and develop geographical thinking.

The diagnosis conducted on the teaching-learning process of geographic coordinates content in the geography subject in the seventh grade at the «Soba Kapungo» School Complex revealed the following insufficiencies: low student motivation for studying geographic coordinates content; teachers show little use of teaching tasks that facilitate meaningful learning for students; as well as limited methodological preparation to develop and implement a well-structured system of teaching tasks.

These findings justify the need for pedagogical intervention, focused on the development and application of methodological didactic proposals that promote the development of student autonomy and the improvement of the teaching-learning process of geographic coordinates content in the geography subject. This research proposes teaching tasks that favor the development of specific student skills and competencies in applying theoretical knowledge about geographic coordinates in practice and evaluating their understanding and performance.

In approaching contributions on the topic, different studies by researchers addressing the teaching-learning process of geographic coordinates were consulted and analyzed, among which stand out: Lima, Souza & Santos (2023); Kinzangui, Monteiro & Diassonama (2021), as well as Santos & Araújo (2020), Breda & Picango (2013), whose innovative methodological proposals using educational games, visual resources and contextualized activities reinforce the need for more dynamic and student-centered pedagogical practices.

These works, originating from different educational contexts, contributed to the scientific foundation of this research and to the development of a proposal appropriate to the reality of the "Soba Kapungo" School Complex. However, despite the extraordinary value of the contributions from the analyzed research in various teaching disciplines, it is noted that such contributions do not focus on Geography teaching tasks, which is one of the natural sciences that most brings students closer to fundamental processes for understanding geographic space, orientation and care for the world around them.

In this context, the present research was conceived with the purpose of seeking a proposal to address the following scientific problem: How can we contribute to improving the teaching-learning process of Geography in the seventh grade, promoting a more effective assimilation of geographic coordinates content? To solve the identified problem, a system of teaching tasks is proposed, supported by elements of philosophy as a guiding framework for learning geographic coordinates content, psychology by considering cognitive development, and pedagogy because it is integrated into practice to investigate and update content.

The proposal of a system of teaching tasks proves timely in light of contemporary pedagogical guidelines that value student autonomy, competency development and active learning. The work acquires even greater relevance considering that current teaching systems demand methodologies that promote the training of critical students capable of applying geographic knowledge in concrete everyday life situations.

METHODS AND MATERIALS

The «Soba Kapungo» School Complex has two Geography teachers and an enrollment of 135 seventh-grade students, which constituted the research population. Two teachers and 90 students were selected as the sample. The research followed a study combining qualitative and quantitative approaches to obtain a more complete view of the teaching-learning process of geographic coordinates content in seventh grade. The study assesses the opinions expressed by students, administrators and teachers about said process and makes an analysis of the numerical data derived from the instruments applied at this School Complex.

During the development of the research, different methods were applied, both at the theoretical and empirical levels, as well as statistical-mathematical methods, which, among other issues, allowed, through analysis and synthesis, to break down the object of study into its essential components, interpret the information obtained during the systematization on the topic addressed, as well as elaborate the conclusions as a result of a synthesis process derived from theoretical deductions; the historical-logical analysis allowed understanding the evolution and development of the research object, its development and fundamental historical connections, as well as determining the tendencies of the historical process of teaching and learning geographic coordinates content in the seventh grade.

The inductive-deductive method allowed making inferences from the results obtained from the responses to the questions applied by each instrument within the empirical methods, both individually and collectively, to determine the current state of the problem, its possible causes and the evaluation of the proposal's results. Observation as an empirical level method allowed, in the geography teaching-learning process, determining difficulties, possibilities and needs of both the teacher and the students in the different stages of the research. Questionnaires and interviews with teachers facilitated the collection of data regarding their criteria concerning methodological preparation for the development of teaching tasks and the importance they attribute to them, as well as characterizing the object and field of research.

The pedagogical test was applied in two stages: initially to verify students' learning of the content and finally to compare and verify validity of the teaching tasks based on academic performance. Mathematical and statistical level methods allowed processing numerical information and interpreting the results of the empirical techniques.

The application of these methods harmonizes in the methodology followed and highlights the practical importance of the research contribution that resides in the system of teaching tasks on geographic coordinates. These allow students to construct their own learning through creative dynamics.

RESULTS AND DISCUSSION

The content related to geographic coordinates is found in the geography subject curriculum in seventh grade and is an essential foundation for the subsequent learning of tenth-grade cartography content, which addresses cartographic representations in greater depth. The analysis of the curricular program evidences that the time allocated to teaching this topic is quite limited, restricted to one hour per week. From a methodological standpoint, the curriculum presents deficiencies regarding detailed guidance on clear objectives, suggestions for teaching methods, didactic resources and specific evaluation forms for working with geographic coordinates.

At this level, teaching geographic coordinates should promote not only the memorization of technical concepts but also the development of geographical reasoning, critical reading of space and the practical application of cartographic knowledge. Students should be encouraged to observe, describe, classify, analyze and interpret spatial phenomena, based on an active and investigative methodology.

To materialize this active and investigative approach in the classroom, it is necessary to have tools that facilitate the observation, analysis and interpretation of geographic space in a concrete and dynamic manner. In the school context, technological resources have come to play an increasingly relevant role, promoting new ways of teaching, learning and interacting with knowledge. In Geography teaching, this presence is manifested through the

use of digital tools, software, interactive platforms, satellite imagery, digital maps and other instruments that contribute to more meaningful, critical and contextualized learning (Sarmiento, 2025). Among the geographic contents that most benefit from this technological and active approach, the teaching of geographic coordinates stands out, a key tool for location and spatial analysis, as it combines the technical rigor of cartography with immediate applicability in territory location and analysis.

Importance of studying geographic coordinates for spatial location

The teaching of geographic coordinates, a fundamental component of cartographic literacy, allows students to develop spatial competencies essential for reading and interpreting terrestrial space. Thus, it becomes crucial that this content is transmitted in a clear, contextualized and motivating manner, so that it favors the construction of critical geographical thinking.

According to Araújo (2014), geographic coordinates are fundamental for the precise location of any point on the Earth's surface, since expressions such as "east of" are vague and do not allow exact location. For this purpose, a system based on imaginary lines is used: parallels and meridians, which structure the concepts of latitude and longitude.

Fundamental concepts that students should master

Latitude is the angular distance between any point on the Earth's surface and the Equator line, ranging from 0° to 90° north or south. This measurement is determined by lines drawn parallel to the Equator (Castellar & Gonçalves, 2020). For its part, longitude represents the angular distance, in degrees, of a point with respect to the Greenwich Meridian, ranging between 0° and 180° both east and west (Haas & Callai, 2021).

The geographic coordinate system is based on a spherical or ellipsoidal model of the Earth. Among the main parallels are the Equator (0°), the Tropics of Cancer (23°27'N) and Capricorn (23°27'S), as well as the Arctic (66°33'N) and Antarctic (66°33'S) Circles. These parallels are essential not only for measuring latitude but also for understanding the Earth's climate zones.

The Greenwich Meridian, by international convention, is the starting point for counting longitudes. It divides the globe into eastern and western hemispheres and is the basis of the time zone system (Moraes, 2014). Its antimeridian, at 180°, marks the International Date Line.

Meridians, imaginary lines with north-south orientation, converge at the poles and have their maximum separation at the Equator. All points on the Earth's surface are associated with a meridian and a parallel, forming a unique coordinate system.

This system, together with digital technologies and the use of GIS (Geographic Information Systems), is today the basis for precise spatial representation and analysis (Guedes, 2021).

Thus, geographic coordinates should not be taught as isolated content but integrated into real contexts, such as locating cities, analyzing different maps, and promoting interdisciplinarity through the application of geographical knowledge (Almeida & Lemos, 2022).

Geography as a science is in constant evolution and demands from the teacher continuous methodological improvement to align with the transformations in how students learn.

This research proposes teaching tasks to facilitate the learning of geographic coordinates content as a result of the assessments made by the teachers selected in the sample and the experience of the authors of this research as higher education educators.

Teaching tasks on geographic coordinates for seventh-grade students.

Objective 1. Systematize the definitions of: parallels, latitude, longitude, geographic coordinates and cartographic projection.

Activity 1:

Examine the following sentences and select those you consider correct as indicated.

1. Parallel to the Equator, circles are arranged that decrease in size as they get closer to the poles.
2. The latitude of a place is measured in km and represents the distance between two points on the planet's surface.
3. Geographic coordinates comprise latitude, longitude, distance in meters with respect to sea level and isohyets.
4. Longitude is the separation, measured in degrees, of one meridian with respect to another, called the Greenwich Meridian.
5. When the network of parallels and meridians is projected onto paper, a cartographic projection is obtained.

Mark the true option:

- if all are correct
- if only 1, 2, and 3 are correct
- if only 1, 4, and 5 are correct
- if only 2, 3, and 5 are correct
- if only 2, 4, and 5 are correct

Objective 2. Locate geographic coordinates (latitude and longitude) of points marked on a world map (Figure 1), so that students understand the division of the Earth into hemispheres, parallels, and meridians, as well as the correct use of cartographic language.

Activity 2:

Indicate on the map (physical world in Figure 1) the latitude and longitude of the represented points.

A: 100° West Longitude and 60° North Latitude.

B: 40° East Longitude and 80° North Latitude.

C: 40° West Longitude and 20° South Latitude.

D: 100° West Longitude and 60° North Latitude.

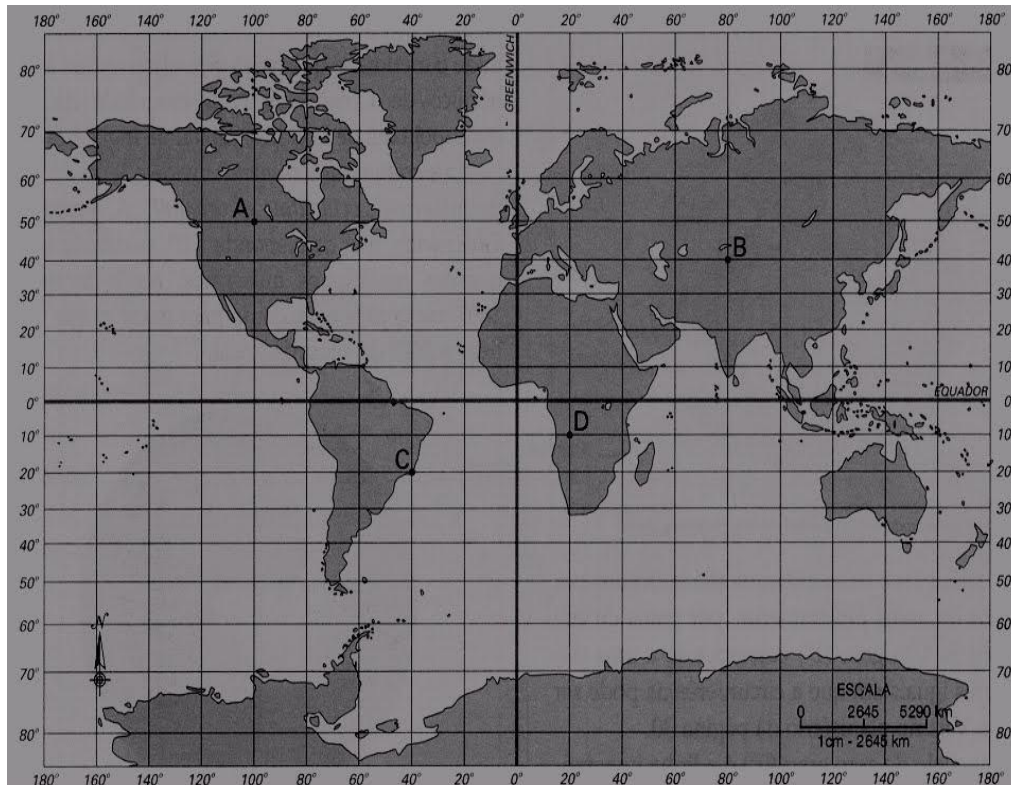


Figure 1: Physical world map. Source: General Education Laboratory (LABFORM).

Objective 3. Locate geographic positions on a world map, using latitude and longitude coordinates to determine the location of different points and elements (such as ships and continents).

Activity 3:

Observe the image in Figure 2 (world map) and identify:

- a) The point located on the Greenwich Meridian and state its longitude.
- b) The points located in the eastern hemisphere.
- c) The points located in the western hemisphere.

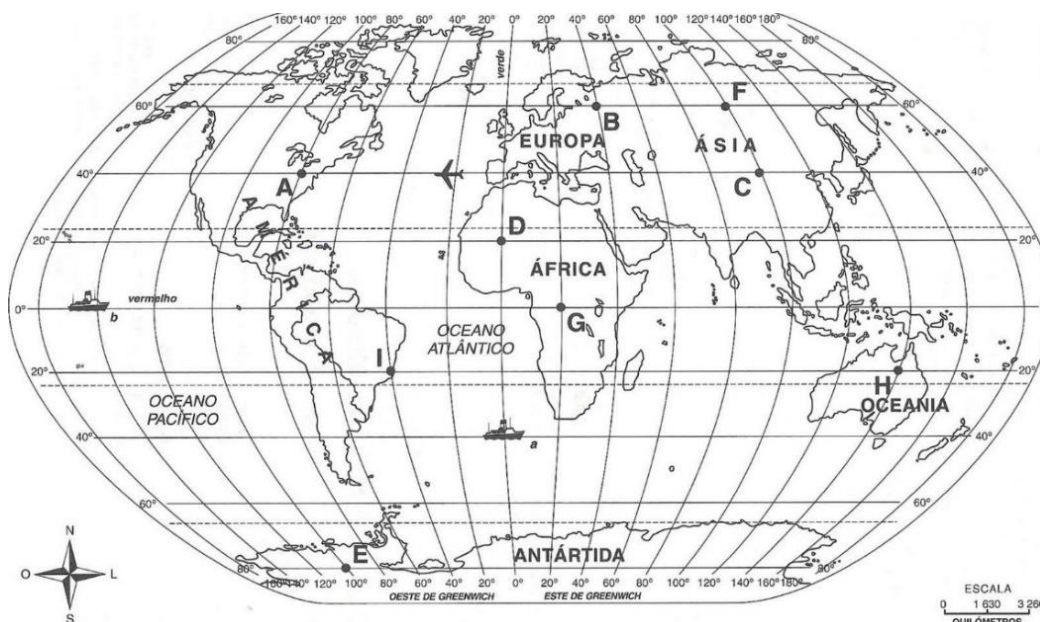


Figure 2: World map. Source: General Education Laboratory (LABFORM).

The assessments of the results obtained with the application of the different instruments and research methods allowed confirming that, with the implementation of the proposed system of teaching tasks, students:

- Achieve greater solidity in knowledge.
- Develop cognitive and practical competencies.
- Demonstrate independence and better performance in carrying out tasks.
- Complete the proposed activities and show growing mastery of the content.

Teachers agree that teaching tasks allow:

- Developing the capacity for argumentation, questioning, evaluation and critical judgment.
- Fostering active and conscious participation in the stages of orientation, execution and control of learning.
- Diagnosing student potential and promoting pedagogical actions that stimulate the formulation of questions and the practical application of content.

- Stimulating observation and comparison of elements of geographic space and developing cognitive and operational skills.
- Using productive and reproductive teaching methods appropriate to the development of meaningful learning.

Therefore, they agree that methodological preparation for teaching geographic coordinates is improved, and it demands from the teacher teaching strategies that promote autonomy, student leadership and content contextualization.

CONCLUSIONS

The proposal is a practical tool that, as a methodological contribution, strengthens the methodological preparation of General Education Geography teachers. It responds to the guidelines of the national educational reform in Angola by promoting active learning, competency development and content contextualization, linking seventh-grade learning with the cartographic bases required in the tenth grade. It is a viable didactic alternative for improving the mastery of spatial location, and its effectiveness is conditioned by the teacher's methodological preparation and its articulation with the principles of developmental learning.

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