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Presentation date: December, 2021

Date of acceptance: March, 2022

Publication date: May, 2022

ENVIRONMENTAL EDUCATION

AT SECONDARY SCHOOL LEVEL IN AFRICA: A CASE STUDY IN BENGUELA-ANGOLA.

EDUCACIÓN AMBIENTAL EN LA ENSEÑANZA SECUNDARIA EN ÁFRICA: UN ESTUDIO CASO EN BENGUELA-ANGOLA.

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Suggested citation (APA, 7th edition)

Rohr Marques, C. M., & Agüero Contreras, F. C. (2022). Environmental education at secondary school level in africa: a case study in Benguela-Angola. *Revista Universidad y Sociedad*, 14(3), 282-297.

ABSTRACT

Environmental education is analyzed in nine groups, 447 students and 20 teachers, in the three grades of a secondary school, in Benguela city, Republic of Angola, Africa. The objective is to assess the characteristics of teaching-learning, group dynamics, and their relationship with environmental education. Elements of environmental management, its contents, and requirements in Africa are considered, together with arguments of the United Nations, UNESCO and others collected in the international scientific literature. Methodologically, a descriptive-explanatory analysis is undertaken from a case study, with purposive sampling, questionnaires are applied to students, teachers, and unstructured interviews to key characters of the studied scenario. To the analysis of historical-cultural, environmental, and curricular documents were added content analysis of each subject program was added. A sociometric test was applied to three groups to describe traits of interpersonal relationships. Statistical processing was carried out with SPSS software, together with other qualitative analyses corresponding to the socio-anthropological perspective. A proposal is constructed highlighting three elements: interdisciplinarity, critical thinking, and the theory-practice relationship in the teaching act. The conclusions reaffirm the hypothesis, verifying that quality in teaching constitutes the basis of environmental education

Keywords: Environmental-education, secondary teaching, Africa-Angola

RESUMEN

Se analiza la educación ambiental en nueve grupos, 447 alumnos y 20 profesores, en los tres grados de una escuela secundaria, en ciudad de Benguela, República de Angola, África. Como objetivo valora las características de la enseñanza-aprendizaje, las dinámicas de grupos y su relación con la educación ambiental. Elementos de la gestión ambiental, sus contenidos y exigencias en África se consideran, junto con argumentos de Naciones Unidas, la UNESCO y otros recogidos en la literatura científica internacional. Metodológicamente se emprende un análisis descriptivo-explicativo desde un estudio de caso, con un muestreo intencionado, se aplican cuestionarios a alumnos, profesores y entrevistas no estructuradas a personajes claves del escenario estudiado. Al análisis de documentos históricos-culturales, ambientales y curriculares, se añadieron análisis de contenidos en programas de las asignaturas. Un test sociométrico fue aplicado a tres grupos, para describir rasgos de las relaciones interpersonales. Fueron realizados procesamientos estadísticos con el software SPSS, junto a otros análisis cualitativos correspondientes a la perspectiva socio-anropológica. Se construye una propuesta que destaca tres elementos: la interdisciplinaria, el pensamiento crítico y la relación teoría-práctica en el acto docente. Las conclusiones reafirman la hipótesis, verificando que la calidad en la enseñanza constituye la base de la educación ambiental

Palabras Clave: Educación-ambiental, Educación-secundaria, África-Angola

INTRODUCTION

Environmental education has had a growing significance in the processes of education since the decade of the '70s of the 20th century, being the subject of several reports, summits, and international conferences. Special attention has been given to this topic internationally when environmental issues are linked to regions in military conflicts, poverty, or where climate impacts, combined with all of the above, have been shown with particular intensity. It is not by chance, therefore, that the African continent has been the focus of attention and concern of international organizations like the United Nations and UNESCO in particular.

The current research presents as main object the environmental education expressed as the ability to describe and analyze environmental problems in the school environment, articulated to the academic results, group dynamics, the contents of the programs of all subjects in school groups of 7th, 8th, and 9th grades. The study was carried out in the basic secondary school of Barrio 70 in the city of Benguela, the Republic of Angola. Therefore, the objective has been the valuation of environmental education as part of the formation in the basic cycle of secondary education, considering the academic results, the group dynamics, and the capacity to describe and analyze the environmental problems of this sociocultural environment.

This educational institution and the groups analyzed are conceived as a descriptive-explanatory case study, with multiple quantitative-qualitative analyses. The socio-anthropological perspective made possible the application of several field instruments. From these results, reflections are made contrasting the tradition of environmental education in Africa with the current problems in Angola and the city of Benguela. The conclusion arouses as need to work for educational quality as a basis for achieving improvements in environmental education.

DEVELOPMENT

Description of the study scenario

The Republic of Angola has one of the economies of Sub-Saharan Africa (SA) with greater resources and possibilities, however, its rise was slowed by the 45 years of war by destroying important networks of social services, forcing the emigration of more than 300,000 Portuguese with essential positions in the infrastructure of service and trade, producing hundreds of thousands of deaths, forcing spatial mobility of millions of its inhabitants and several thousand refugees. Thus, the footprint of the war transcends time and impacts in multiple ways development and consequently general education, culture, and environmental education.

Benguela is the capital city of one of the 18 provinces that geopolitically divide the Republic of Angola. It is located in the central-western part of the country, with more than 39 000 kms², occupying 3.9% of the national territory, its geomorphological structure is complex due to the combination of plateaus, valleys, mountains, dry rivers, and being drained by five hydrographic basins (Balombo, Cubal, de Hanha, Catumbela, Cavaco and Caporado) that originate fertile valleys in the area of the Atlantic coast (Da Rocha, 2012). However, the aridity of the soils, deforestation, desertification advances, processes in which the impacts generated by the changes of the so-called Cold Current of the Gulf of Benguela are present, bring ecological complexity to the area.

From the point of view of the administrative political division, the 10 municipalities of this province, those of Benguela and Lobito concentrate the highest levels of urban infrastructure, socioeconomic, industrial, and demographic development. Since the city is geophysically located on the coast, like Luanda and others, and because it has suffered less intensely the impacts of the war for more than forty years, it received the influx in multiple waves of forced human displacement, to which is added a strong rural-urban migratory movement after the end of the war and the civil war. The city, together with the other three coastal cities, came to account for 56% of the Angolan population (Azancot De Menezes, 2010). This generated spontaneous urbanization, the absence of infrastructure, and the consequent lack of sanitation, a process that has led to a chaotic environment, housing, education, health, leading to the spread of unhealthy conditions, marginality, informal economy, and labor market, violence and slum life.

From the socio-demographic point of view, almost three million inhabitants of the city of Benguela are characterized by deformations in their age structures, with the 0 to 14 age group representing 45% of the population, the 20 to 49 age group 43%, and the over 50 age group only 12%. The city has an annual growth rate of 13.7%, considered one of the highest in the region and the world, which has generated a real demographic explosion since 2004 (Da Rocha, 2012). According to the 2014 Census, only 3.6% of minors attend pre-school education, only 56.10% of the population over 15 years of age is literate, 79.7% live in housing with inappropriate materials, 46% have access to appropriate water sources, 29.4% receive electricity from the network, and only 34.8% have adequate sanitation (Instituto Nacional de Estatística, 2014).

In Benguela, the same environmental problems faced at the national level can be observed. However, three elements of an objective nature grant a first complex component to the environment of this area:

- A. The Large Marine Ecosystem called, Cold Current of the Gulf of Benguela, which encompasses three countries: Angola, Namibia, and South Africa, its modifications imply not only global changes but at regional-local level, it generates alterations in rainfall, the basis of the subsistence agrarian economy prevailing in the study area and its adverse influences on the food situation.
- B. The disappearance of the mangroves in the coastal zones of Benguela - Lobito and its implications in the salinization of the soils, decrease of the agro-productivity with great and serious implications in the agricultural systems, and the loss of biodiversity especially for the pink flamingo.
- C. Finally, there is the growing advance of the Namibe desert, which begins south of the city of Benguela, whose causes at the local level are identified with the excessive and uncontrolled deforestation for charcoal production, fires caused by farmers, intensive cattle grazing, among others.

Figure 1 below provides an overview of the Republic of Angola in the African context, the 18 provinces of this nation, the 10 municipalities of the province of Benguela, and the scenario where the secondary school of Barrio 70 is located in the capital city of this province, from various maps-images and different sources.

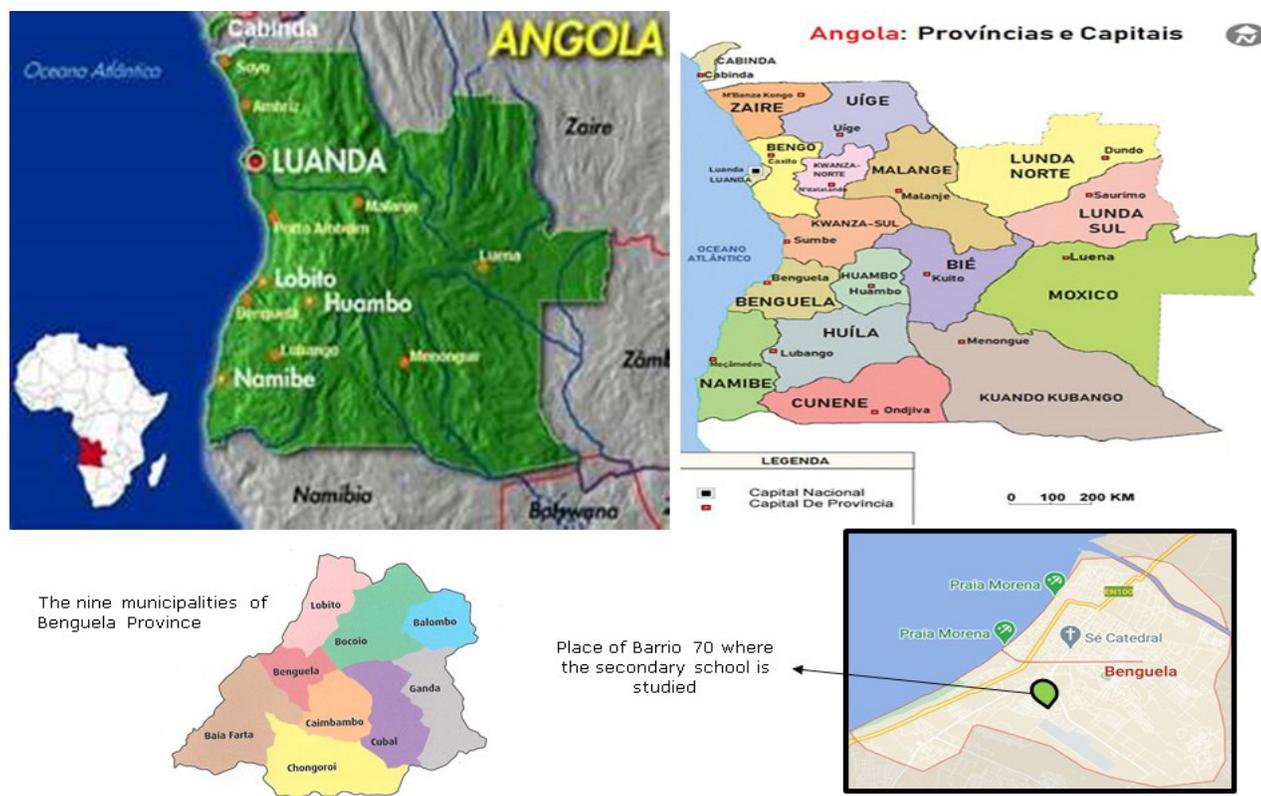


Figure 1. Map of the Republic of Angola, their 18 counties and Benguela Province with their nine municipalities and the place of Barrio 70, where the secondary school is studied (Images from internet).
Source: Author

Related to the spaces of the province of Benguela, two main elements should be noted, as it is shown in Figure 1. First, the fact that, based on the 2014 population census data, it is the municipalities of Benguela and Lobito that concentrate, with their darker colors, the highest population density. Secondly, the territories of the 10 municipalities are fragmented by various watersheds. The reduced image of the location of the Barrio 70 secondary school shows its immediacy with the center of this city, its proximity to the coastal zone, and its convergence with areas of large human concentrations.

The Human Development Index (HDI) showed an upward trend from an index of 0.337 in 2001, to 0.448 in 2011 and 0.558 in 2018 (Conceição, 2019). This was reflected in indicators of schooling of the population, the quality of education, its universalization, quality, and life expectancy. The role of education became essential in the expansion of environmental education and the cultural development of society, in its broadest social strata and spaces (Quinta & Patatas, 2020). At the ideological level, the school curriculum faced the impacts and expressions of corruption, since it is a phenomenon very impregnated socioculturally in social life, as part of the colonialist cultural heritage. A measurement made from the social perception of this phenomenon in citizenship shows it very high, both on a scale with the interval from 0 to 100 points, to show that higher values, close to its top, indicate greater transparency and less corruption, while lower values indicate the relevance of the phenomenon. The referred measurement reached for 2019 a value of 26 points (Moreira, 2020), which verifies the persistence and magnitude of the phenomenon.

The dynamics of Angola's economy have made the social panorama more complex, with multiple implications for education. The graph below shows the trends and their reflection in the republic's GDP.

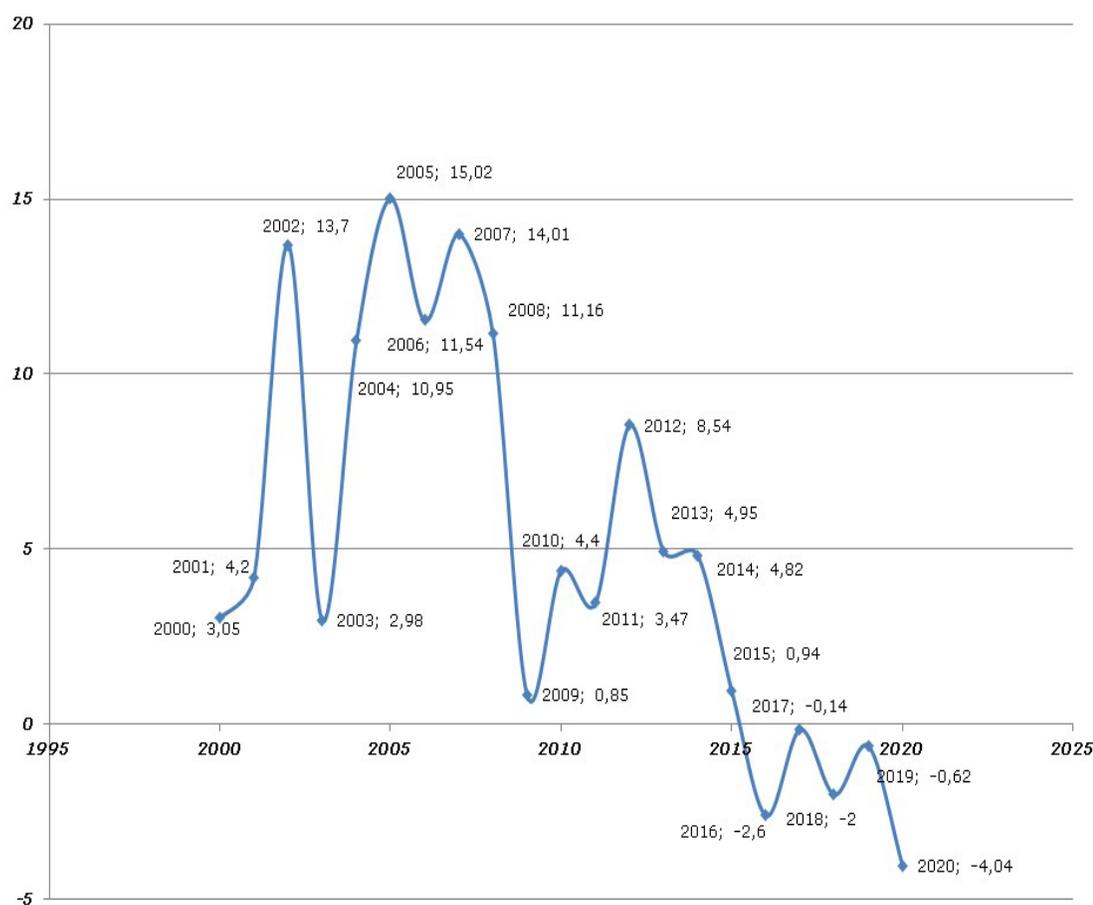


Figure 2. GDP Republic of Angola 2000 - 2020 (%) according of World Bank

Source: Author

As it is recognized by the World Bank, three essential factors have limited socioeconomic development and sustainability, despite the availability of important natural resources. The factors identified are:

- A. Macroeconomic instability and financial imbalance.
- B. Limitations in the growth of the private sector
- C. Exclusion of the poor population in growth and therefore limitations in poverty reduction,(World Bank, 2019).

These realities place challenges for general and environmental education in particular, complex, in the face of commitments to the 2030 Agenda for sustainable development. The training process of adolescents and young people is essential during the first cycle of education, the secondary school level, requiring important theoretical, pedagogical, and didactic positions. In the context described above, therefore, quality educational activity at the secondary school level, and in particular environmental education, is urgent and cannot be postponed.

Theoretical conception of environmental education

Concern for the environment began to have a growing repercussion in the world since the sixties of the twentieth century. The major world conferences and meetings of the United Nations reached a transcendental moment at the Rio de Janeiro Summit in 1992, where 21 Agenda was approved, which specified essential actions for the development of environmental education. Similarly, the Johannesburg Summit in 2002 provided clarification on essential environmental content for education at all levels and scales. Of particular significance was the approval by UNESCO of the so-called Decade of Education for Sustainable Development (DESD), from 2005 to 2014, and the theoretical and practical activities developed for the realization of these commitments.

An analysis of the theoretical, practical, pedagogical, and didactic requirements and contents for environmental education, especially at the secondary school level and the work with adolescents and young people, shows the following elements, extracted from various documents. Thus, environmental education should:

- A. Be interdisciplinary and holistic: teach sustainable development in an integrated way as a whole, not as a separate discipline.
- B. Include value contents: teach to share the fundamental values and principles of sustainable development.
- C. Promote critical and developmental thinking, the ability to find solutions to problems. To teach confidence in the face of dilemmas and challenges of sustainable development.
- D. Work with a multiplicity of methods: to teach the use of words, art, drama, debate, experiences, diverse pedagogies to face the processes.
- E. Stimulate participatory processes in decision making, involving students in decisions about how to study.
- F. Integrate learning experiences into personal and professional life.

- G. Develop educational activity closely linked to the life of the communities and localities, using languages that students can assume.

Although the African continent has never been unaffected by concerns about environmental issues, the intensity of the debates and analyses surrounding these issues has been less intense than in other regions of the world. However, the actions were undertaken by the United Nations (UN) and UNESCO (UNITED NATION FOR EDUCATION, SCIENCES AND CULTURE ORGANIZATION) as a whole, particularly after the 1992 Rio de Janeiro Summit, were essential for the deployment of actions in favor of environmental protection and care, as well as environmental education. The activities of the Kenyan Wangari Maathai, with the Green Belt Movement in Kenya, recognized with the Nobel Peace Prize in 2004, had great repercussion, conceiving a campaign to plant millions of trees, launched with the support of the United Nations, at the 2006 Nairobi Convention on Climate Change (Waldman, 2010). The aforementioned campaign for the arborization of Africa had great repercussion and reception, encouraging diverse and immediate actions and leadership in Ethiopia, Rwanda, Tunisia, South Africa, Morocco, Somalia, and Liberia. Along with the leadership of the aforementioned Kenyan university professor, the Nigerian Ken Saro Wiwa (1941-1995), the Congolese René Ngongo, the Senegalese Baba Dioum, the Malinese university professor Sidibé Aminata Diallo, whose actions had a strong impact in Mali, Guinea Conakry and Burkina Faso. The work of the South African civil and environmental rights activist Dudu Mphenyake and the Somali environmentalist Fatima Jibrell had strong repercussions (Waldman, 2010). This movement spread around the world towards the end of the first decade of the 21st century, which shows that environmental education in Africa has relevant antecedents.

In multiple meetings, encounters, and documents referring to the African continent, UNESCO reinforced the concept of the need for environmental education to strengthen its rigor and depth, with special emphasis on quality and secondary school levels, and the need to articulate the demands of regional and national development with those of the localities where educational institutions are located and the imperative of educating by doing, linking theory with practice. Likewise, contents and programs of the United Nations were gradually inserted into African environmental education, among which can be added education for the defense and preservation of biodiversity, for the reduction of risks and disasters, such as the fight against desertification and the expansion of deserts.

In the deployment of environmental education at the educational institutions level, the role of teachers is essential

and naturally, the progress of educational reform is also correlated significantly with the previous training of teachers. Teachers' attitudes and motivations become essential factors to develop the competencies that environmental education requires, to face diversity at the group level and in the teaching-learning process (Gebauer & McElvany, 2020). It means that the institutional cultural environment appears essential for the conformation of a favorable climate to face the challenges and the challenges that working with groups of children and adolescents imposes in the formation of new generations. Among the challenges in this area is the fact that environmental education at the African content level is still underrepresented (Lotz-Sisitka et al., 2021), while changing global circumstances and their interactions with local scenarios make their processes more complex (Scott, 2020).

The contents of sustainability and environmental education in learning processes, especially at the secondary school level, contribute more solidly when links are developed between local educational institutions through different channels, in territories and regions (Schlebusch, 2020). This perspective imposes observing local scenarios, their dialectic with global influences, as well as delving into local traditions and culture. These contents require a connection with the dynamics of the economy, articulation, with approaches to families, especially when deficits are perceived in academic performance and with the dynamics that are generated in these circumstances with lower-income families (Carmona, 2020). The ability to understand multiculturalism and undertake a coherent intercultural positioning is crucial.

However, the influences of the market are not absent and therefore there are tendencies to limit training processes among teachers, increase the privatization of education, to reduce the role of research and curricular innovation (Castelao-Huerta, 2021). This coincides with attitudes held by teachers regarding the need to undertake profound changes and transformations in educational systems, aimed at benefiting the great majority, strengthening the quality and scientific bases of teaching. Studies in public schools in Sub-Saharan Africa show negative attitudes among teachers towards transformative educational policies while showing deficits in the work with reading and mathematical calculation.

Environmental education should open dialogues between human groups, reinforce the critical perspective, visualize the environment and the context with greater breadth and rigor, especially by encouraging citizen participation. Such positioning leads to the need to subvert the influences of colonialism in the so-called postcolonial curricula, for which, educating by doing becomes essential, however,

it is necessary to know in depth the interests, needs, and motivations of students (Sibanda & Young, 2020), to open and encourage dialogue, reflection, criticism, and participation from that knowledge.

By working with elements of the climate and the environment, new and authentic cognitive proposals can be built, a basic issue to achieve the commitment of students (Sajjanhar et al., 2020), their enthusiasm, and achieve meaningful learning. For such purposes, the learning of conceptual systems around ecology is key, but this depends a lot on the capacity of teachers (Llorens et al., 2019), since the weight of pedagogical practices of colonialist nature, at the secondary education level, represent a walled stumbling block not only in Africa but also in much of the world. Therefore, even if the curriculum adequately reflects the needs and interests of the students and is inclusive, it may retain colonial positions (Sibanda & Young, 2020). The scientific attitudes encouraged among teachers towards an innovative curriculum as a basic axis for environmental education generates very heterogeneous positions within the teaching groups, a process in which training is essential.

Although decolonization has been on the rise in Africa since the sixties of the twentieth century, the influence of the subordinate, colonialist worldview on world views and perceptions continues to permeate deeply into human groups, including teachers. Therefore, the weight of colonial thought constitutes one of the most complex stumbling blocks in the African context. The need to contextualize knowledge in the pedagogical act from the local level (Wright et al., 2021), seen not as transmission of knowledge, but as construction of knowledge, constitutes a theoretical and epistemological need to deploy innovative curricular actions, including environmental education, based on science and the best of the traditions of each people and region. At the didactic level, it requires the assumption of principles such as the articulation of school and teaching with life, a connection with community-local scenarios, and the upward linking of theory with practice.

This constitutes an imperative, since from these edges emerge the contextualization of teaching, because to the extent that it is consolidated, it encourages collaboration and participation, promotes education in values and more positive attitudes, empowers students, distinguishes the value of social learning, encourages favorable attitudes towards the environment, highlights the role of the family, improves academic performance, stimulates reflective thinking and encourages teachers to overcome deficiencies in knowledge (Villanueva Blas, et al., 2020). Therefore, it becomes essential in the processes of teaching and learning in general and in particular for

environmental education to assume the due contextualization of the process to achieve effectiveness at the level of cognition of the groups. This aspect distinguishes the importance at the same time of cooperation, integration, and the affectivities prevailing in the educational environments of school groups.

The indicated theoretical deficits explain the fragilities and asymmetries in the education of responsibility, the deployment of a coherent ethic in the teaching act, the real inclusion and non-discrimination in any of its expressions, which reduces the quality and without which environmental education does not achieve its purposes. In this way, theoretical deficits constitute a relevant factor that inhibits the deployment of environmental education in the context analyzed. For environmental education to be real, true, credible, and attractive to students, it not only requires a permanent search in the theory-practice relationship, but also the imperative of transformation, multidisciplinary positioning, the construction of an environmental and democratic horizon, for which socio-educational or pedagogical intervention is required, which can even be accompanied by playful processes, as part of the broad spectrum that can be part of it (Nieves Chávez & Olvera Pantoja, 2020).

As has been recognized, the trajectory of Angolan education since the multiple and intense modifications undertaken shows the complexities of these processes. Only with the liberation was education recognized as a citizen's right, free access, and free of cost. As a political priority, it was assumed as a means of consolidating national independence. Therefore, after the signing of peace and the conclusion of the internal conflict, the review of the educational situation led to the elaboration of the Integrated Strategy for the Improvement of the Educational System, 2001-2015, as part of which the education law was modified and the educational reform was initiated. The Constitution of the Republic of Angola, approved in 1992, initiated the II Republic and its environmentalist contents are distinguished. In this Magna Carta, the environment appears as an obligation of the state to adopt measures to protect it, to deploy environmental education, to achieve ecological balance, and at the same time to sanction harmful acts (Quinta & Patatas, 2020).

In 1998, the Basic Environmental Law was approved, where environmental education is defined as a citizen's right and duty, the basis for the necessary understanding of the balance with nature and to proceed consciously in defense of the environment. It specifies that environmental education must be formally and permanently organized in the education system at all levels and in social communication systems. The new constitution of 2010, which initiates the third republic, takes up the above and adds the

improvement of the quality of life and citizen health, environmental protection, the sensitization of the population on environmental issues, including school programs to raise awareness of the need for recycling and solid waste management.

Based on the descriptions, assessments, and arguments analyzed, the following research question is formulated:

¿What characterizes environmental education at the level of teaching-learning in secondary school, in the groups and grades studied in the educational institution of Barrio 70 in the city of Benguela?

To this question, the following working hypothesis is presented:

Environmental education at the secondary school level is characterized by being spontaneous, a systematic, and little contextualized despite having adequate curricular contents, which is explained by:

- A. Limitations in students' academic results.
- B. Lack of sociometric integration in analyzed groups.
- C. Phenomenal vision of environmental problems.
- D. Lack of critical approach to environmental issues.
- E. Inconsistencies in the work of professors

METHODOLOGY

The present research is developed as a descriptive-explanatory study expressed in a case study, where quantitative and qualitative approaches are combined. From the qualitative point of view, context studies are undertaken, and based on them, multiple documents are analyzed about the local-regional history, the selected educational institution, the documentation of the educational reform, and where the programs of all the subjects that are worked in the three grades of secondary education or first cycle were included. From the quantitative perspective, the research is analyzed with a set of variables that are subsequently explained and processed in detail.

The case study can be defined as a training and research method that involves an intensive and in-depth examination of various aspects of a phenomenon. This option, although it is one of the most widespread and well-known within the qualitative paradigm, does not exclude quantitative analysis, nor intervention processes in practice when it is considered necessary and favors the connection with the contexts (Creswell, 2013). It becomes the study of the particularity and complexity of a singular case to understand its activity in important circumstances, it is an integrated system.

From the epistemological perspective, essential principles were conceived as the dialectic of the general with the particular and the singular. This made it possible to value environmental education in the world, some particularities in Africa, and the situation in the Angolan nation as in the province and city of Benguela. In the same way, education and the demands of environmental education are valued. A second principle assumed at the epistemological level is the dialectic of the historical-logical as a basis for understanding and reasoning the dynamics between the history of the nation, those of the continent, and particularities that occur in the region of study. That perspective also makes it possible to value the contributions that the legacies of colonialism impact educational practices and training processes in the present.

The semi-structured interviews focused on essential aspects of social, cultural, and educational history. Aspects of the history of the pedagogical training of the teachers, of the institution studied, as well as some elements of the socioeconomic and cultural evolution of the region and of the country, were valued. As part of the document analysis, the records obtained by the students of the groups studied in each of the subjects corresponding to each year or grade of high school or first cycle were analyzed. The socio-anthropological approaches made it possible to construct syntheses that show the essences of the complexities and challenges faced by general education and environmental education in the region, closely articulated with the educational institution and the socioeconomic and cultural evolution of the study area. Chart 1 below summarizes the main variables, indicators, instruments, and measurements applied under study.

Chart1. Main studied variables, indicators, measurements, and instruments				
No.	Studied variables	Indicators	Instruments	Measurement
	The socioeconomic, cultural, historical, and environmental context at Benguela city is linked to the academic development of students and the professor's actions	Impacts of war Tendency of GDP 2000- 2020 Impact of Cold Storm of Benguela Gulf Index of Human Development Geomorfological features	Document análisis, Unstructure interviews	Nominal
	Sociological, anthropological, and demographic features of students and professors of the secondary school of Barrio 70.	Ethnic, Population groups, demographics structure and features	Document análisis, Unstructure interviews	Nominal Ordinal
	Students' capacity to perceive the environmental problems	Economic, social, and cultural impacts of environmental problems	Document análisis, Unstructured Interviews, Questionnaire	Nominal Ordinal
	Academic results of the teaching-learning process	Academic marks of students in whole subjects and grades	Questionnaire	Nominal Ordinal
	Professors' methodological conceptions toward the educational act, teaching-learning process, and environmental education	Approaches and points of view about components of the teaching-learning process	Unstructur Interviews, Questionnaire	Nominal Ordinal
	Sociometrics characteristics of the studied groups	Six sociometric indicators: three individuals and three at group level.	Sociometric Test	Nominal Ordinal

Curriculum for secondary school at the Republic of Angola. United Nations Organization and their African documents UNESCO Programas and action for Africa Program of each subject at the secondary school at Barrio 70 in Benguela city	Principal theories, approaches, and actions toward environmental education	Document analysis, Unstructured Interviews, Questionnaire	Nominal
Source: Author			

The questionnaire was essential for understanding the performance of both teachers and students. For the students, we inquired about features such as age, school grade, family membership, areas of residence, educational and professional characteristics of the parents. Concerning the educational process, the frequency of repeated grades, academic results, and how environmental problems were identified and taught. Three school groups were selected, one for each grade, based on the assessment of academic performance in all subjects, and a sociometric test was applied to them.

The sociometric test as a scientific resource became essential for understanding the complexities of the groups to understand their fragilities and strengths at the same time from the perspective of interpersonal relationships as key elements of the learning and formation processes in adolescence. In the starting situation, a hypothetical situation was explained to the students. They were to assume that they would go on an excursion through the region, including rural areas where they would have to spend the night, feed, and protect each other. To this end, groups of three people were to be formed, who were to be identified from their school group, and three others, who for a variety of reasons would not be part of their group. From this technique, 6 indicators were extracted, three individually for each student and three for the groups. At the individual level, the following were considered: popularity indexes, rejection, and the affectivity coefficient, while at the group level: association indexes, coherence, and the divergence coefficient.

A non-random sampling, of a purposive nature, was assumed, based on the possibility of working with students with whom the authors were related. As it is recognized this approach favors from the interactions and the knowledge that the researchers take from the subjects studied, while as a limitation the inability to generalize the findings. We worked with a total of 9 groups of students, three from each school grade, totaling 447 students: 106 in the 12-13 age group (24%), 183 in the 14-age group (41%), and 158 students in the 15-17 age group (35%). Of all the groups studied, 165 students correspond to seventh grade (37%), 138 students to eighth grade (31%) and 144 students correspond to ninth grade (32%).

Table 1. below also shows the overcrowding in the different groups studied, the prevalence of females, and the distribution by age group.

Table 1. Characteristics of school groups according to age groups and sex

Grupos	AGE- GROUPS				Sexe		Total
	12-13	14	15-17	Total	Masculine	Feminine	
7 ^a E	16	30	10	56	25	31	56
7 ^a H	2	32	23	57	31	26	57
7 ^a K	20	28	4	52	21	31	52
8 ^a B	32	14	1	47	18	29	47
8 ^a C	26	18	2	46	19	27	46
8 ^a E	0	18	27	45	19	26	45
9 ^a A	10	21	15	46	15	31	46
9 ^a B	0	14	33	47	18	29	47
9 ^a C	0	8	43	51	21	30	51
Total	106	183	158	447	187	260	447

Source: Documents of enrollment and marks of each group (Author).

In the case of teachers, 20 teachers were randomly selected among the 45 who interacted with the groups studied. This questionnaire focused on three essential elements: the socio-demographic components of training and development, including the reasons for becoming a teacher or professor, the context approach in which 12 items were analyzed, assuming a variant of the Likert scale, considering the frequency of always, sometimes and never. Similarly, from the methodological perspective, the treatment of contents of great environmental transcendence in the context of the teaching of the subjects in the different school grades studied was assessed. Fifteen items were defined and evaluated from four dimensions: always (5), sometimes (4), rarely or exceptionally (3), and never (1). The methodological approach, depending on its systematicity and coherence, is close to environmental education.

From the statistical point of view, the processing of the information gathered proceeded both qualitatively and quantitatively. In the first case, strategies of content analysis and qualitative analysis were followed to identify the deep reasons that intervene in the processes. Quantitatively, we worked with SPSS. In all cases, Cramer's V coefficient, Pearson's coefficient, Kendall's Tau C, and Spearman's correlation coefficient were applied. In the first two cases to identify possible associations and in the last two cases to verify the intensity and direction of the correlations. Qualitative analysis techniques were applied for the different aspects, processes, and contents submitted as part of the document studies, semi-structured interviews, and as results of other inferences from the quantitative analyses. This made it possible to triangulate sources, methods, and actors in the study scenario.

RESULTS

The realities observed in the immediate areas of the educational institution studied, as well as in the students' areas of residence, impose the need to strengthen environmental education as part of the management to achieve sustainable development. A synthesis from the socio-anthropological point of view makes possible the description and assessment of complexities in the configuration of the historical-cultural processes in the study area, which pose challenges for general education and in particular for environmental education in the whole region. The results of the semi-structured interviews and the documents studied to allow the identification, highlighting, and synthesizing of three complex factors, which are listed below as essential elements, resulting in challenges to general education, environmental education, and the deployment of all actions for the work according to the

2030 agenda for sustainable development in the province of Benguela and the entire Republic of Angola. They are:

1. The centuries-old colonial heritage that imposed and structured:

- A. A model of rentier export economy: centered on oil and diamonds.
- B. Cultural and technological backwardness.
- C. Corruption as a social practice of mobility
- D. Deep social asymmetries
- E. Large and serious ethnic prejudices
- F. Banking pedagogical practices: reproductive, rote learning.
- G. Colonial culture: culture of subordination, silence, and uncriticism.

2. Impacts of the war of liberation and civil war for more than 40 years:

- A. Loss of civil, technological, and productive infrastructure.
- B. Forced displacement of important groups of the population.
- C. Loss of human resources
- D. Concentration of large human groups with severe environmental consequences: spontaneous urbanization, overcrowding, precarious housing, severe stress on education and health services.
- E. Lack of water and sanitation infrastructure, slum areas, growth of the informal economy, etc.

3. Ecological impact of the Cold Current of the Gulf of Benguela:

- A. Alterations in the seasonality of the year: major droughts.
- B. Growth of desert areas.
- C. Growth of soil aridity
- D. Upward deforestation

The three factors and their extensive implications, interconnections, and interdependencies are currently mediated by the impacts of globalization, the weight of the pseudo neoliberal culture, the role of the market and its articulations with the fetishization of reality, the exacerbation of consumerism, and the consequent expression of these processes, inhuman behaviors of an uncritical, incoherent and irresponsible nature.

The content analysis of the curriculum from the subjects of the three grades studied allowed the authors a deep

understanding of the real possibilities to undertaking systematic and deep approaches from the educational and institutional context. Figure 3 below illustrates these curricular characteristics.

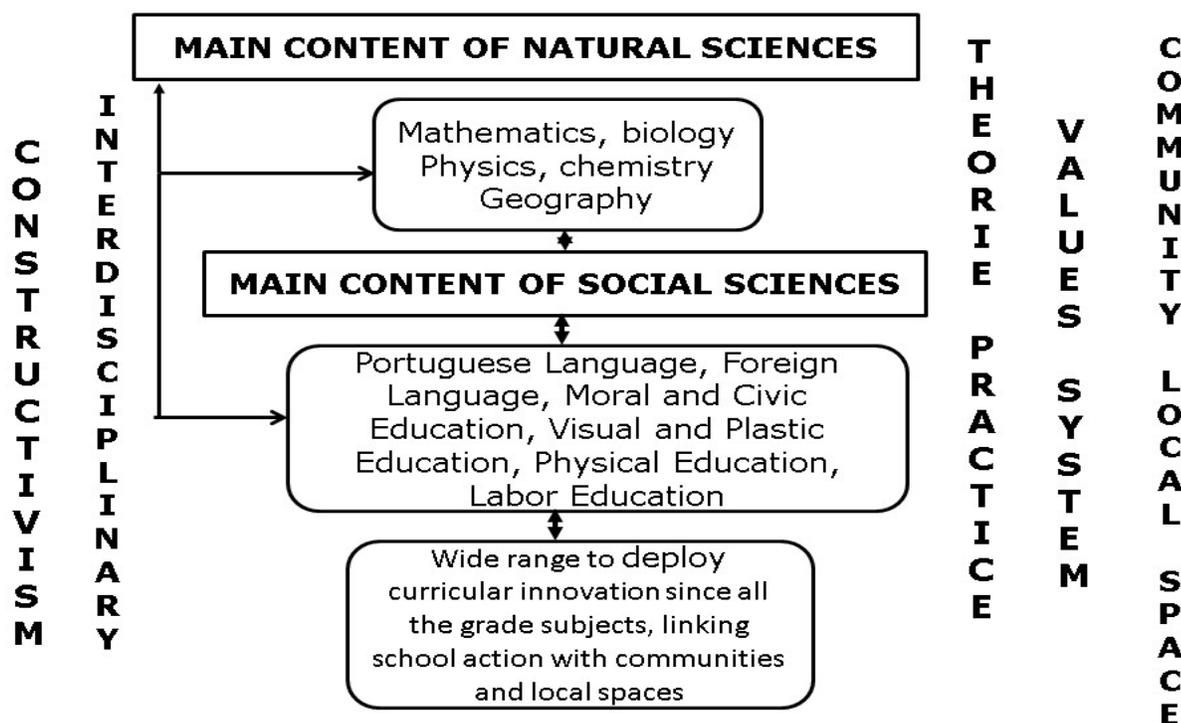


Figure 3. Principal theoretical contributions of curricular subjects to environmental education at secondary school according to Angolan Educational Law
Source: Author

The support of a theoretical position of constructivist nature, the assumption of the principle of interdisciplinarity as the intentionality of articulating theory with practice, and the recognized need to link with community environments and in a system of coherent values, lead to raise and recognize the possibilities of this perspective to undertake processes of curricular innovation, to subvert obstacles and strengthen the quality of teaching, learning and environmental education.

Semi-structured interviews with teachers, students, and family members, accompanied by document analysis and some observations showed vulnerabilities that impact training, education, including environmental education. Among these are:

- A. Age gaps of students about their school grades.
- B. High repetition rates
- C. Levels of overcrowding of students per classroom in the education process.
- D. The special situation of girls: school dropout [domestic work, early pregnancy, joining the informal labor market].
- E. The multicultural and multiethnic nature of the groups and the absence of capacities to work interculturality in the teaching act.
- F. Teacher shortage
- G. Theoretical-methodological deficits in teachers: inability to adequately contextualize teaching-learning and innovate in the educational activity.
- H. Failures in the quality of teaching: banking and reproductive tendency.
- I. Predominance of disciplinarity in teaching.
- J. Low perception of environmental issues.

K. Inconsistencies in the curricular work at different levels of education.

L. Failure to take advantage of traditional culture and belief systems.

Deficiencies were verified in the teaching and learning processes related to the incongruities in the teaching activity found in the questionnaires made to teachers as well as in the academic results of the students regardless of their grade level. The table below shows the frequency of teachers' approaches to essential elements involved in environmental education in the local context.

Table 2. Frequency of environmental issues focused by teachers during

Teaching-Learning Process.				
No	Tell us, the frequency of treating, commonly in your teaching-learning process, around the environmental problems of your students in this region? N=20	Never	Only Some- time	Always
1.	The question of the social participation in all the scenarios	3 (15%)	13 (65%)	4 (20%)
2	Problems of the family in Africa	3 (15%)	13 (65%)	4 (20%)
3	The need to increase dialogue and avoid violence among people	2 (10%)	5 (25%)	13 (65%)
4	Good relationships with other people	0	4 (20%)	16 (80 %)
5	Implications and prevention of diseases such as malaria, tuberculosis, and AIDS	2 (10 %)	14 (70%)	4 (20%)
6	The need for personal hygiene and good looks	1 (5%)	1 (5%)	18 (90%)
7	Climate change and its reflection on whole life today.	3 (15%)	13 (65%)	4 (20%)
8	Approach well-being and conflict family issues	5 (25%)	10 (50%)	5(25%)
9	Presents issues of social communication	0	14 (70%)	6 (30%)
10	Reflects on the problems of hunger and poverty	7 (35%)	9 (45%)	4 (20%)
11	Methods to prevent disease and early pregnancy at adolescence	0	8 (40%)	12 (60%)
12	Stimulates student participation, self-learning, and community change	0	13 (65%)	7
13	Its activities are motivating students to study and advance academically	1(5%)	0	19 (95%)
Source: Questionnaire to professor of secondary school Barrio 70 (Author).				

Among the teachers interviewed, 65% are between 25 and 39 years of age, the remaining 35% are between 36 and 48 years of age. Fifty-five percent had between 1 and 10 years of teaching experience, while 45% had between 11 and 29 years of teaching experience. Fifty percent of those interviewed corresponded to each sex. The teachers interviewed tended to work indistinctly with the three teaching grades (7th, 8th, and 9th grade), and although they expressed general satisfaction with their activities, and recognized themselves as creative in general, they showed relevant inconsistencies in the frequencies in the treatment of essential themes related to the environment. Comparing in the table above, the frequencies of approaches to environmental contents, in the categories, only sometimes treated and never treated, reveals the magnitude of these processes.

The deficits in teaching can be seen even more clearly when examining the range of academic averages achieved by all 447 students included in the nine groups worked with. Those evaluated as poor, with scores below 9.99 represented 15.2% (68 students), those evaluated as fair, with scores in the range of 10 to 13.99 reflected 82.6% (369 students), and those included with results evaluated as good, above 14 points, represented 2.2% (10 students).

Among the implications of these processes, the first shows a limited capacity of students, regardless of their grade level, to make judgments about environmental problems. There was consensus in the identification of urban problems, given their evident magnitude and their articulation with infrastructure deficits, as a guarantee of adequate sanitation, amid spontaneous urbanization and agglomerations and overcrowding, as a result of the impacts of migration. Seventy-one percent of the students agreed with this identification; however, the absence of a critical perspective was

striking. The second element of greater consensus was expressed in the need to undertake tree planting or reforestation (19.9%) as an imperative need before the impacts of climate change, the scarcity of rainfall in residential areas, and the very evident progress of desertification. The third element of greater consensus was identified by the students as the development of healthy social relationships (8.9%), referring in this particular case to the need to achieve respectful behavior among citizens, encourage non-violence, promote civic peace, cleanliness, denounce bad habits such as corruption, backbiting, envy, among others.

Much interest was shown in the crossing of the variables, academic performance with the ability to identify environmental problems. Table 3 below shows the results discussed.

Table 3. Academic mean in all subjects and identification of environmental issues

Academic means evaluated of 12 subjects in each school level N=447	CAPACITY BY STUDENTS OF IDENTIFYING ENVIRONMENTAL PROBLEMS			Total
	Absence of urban infrastructure	Need for Reforestation	Healthy social relations	
BAD	51	11	6	68
% Academic mean evaluated	75,0%	16,2%	8,8%	100,0%
% Capacity to identify environmental problems	16,0%	12,4%	15,0%	15,2%
REGULAR	260	75	34	369
% Academic mean evaluated	70,5%	20,3%	9,2%	100,0%
% Capacity to identify environmental problems	81,8%	84,3%	85,0%	82,6%
GOOD	7	3	0	10
% Academic mean evaluated	70,0%	30,0%	,0%	100,0%
% Capacity to identify environment problems	2,2%	3,4%	,0%	2,2%
Total	318	89	40	447
% Academic mean evaluated	71,1%	19,9%	8,9%	100,0%
% Capacity to identify environmental problems	100,0%	100,0%	100,0%	100,0%
Source: Marks register reached by students in each subject and grade of school. (Author).				

The levels of association and correlation between the mean scores that reflect the academic average in the 12 subjects and the capacity to identify and describe environmental problems did not show, in any of the three school grades, significant relationships as expressed by the following indicators. The Chi-square test $X^2=2,113$ gl4 $p>0.05$, Kendall's Tau C coefficient (0.015, $p>0.05$), Contingency Coefficient (0.068, $p>0.05$), Cramer's V (0.049, $p>0.05$). It is verified that the low academic indexes that on average prevail in the three school grades did not present relevant associations with the limitations in the environmental criteria and conceptions expressed.

The semi-structured interviews with 47 students of the referred school grades (16 of 7th grade, 14 of 8th grade, and 17 of 9th grade) evidenced more coherently the referred limitations. About the causes of the problems that they identified as essential to environmental alterations, as they converge between 53% and 76% of those interviewed, the following were placed:

- A. People's behavior, with emphasis on social indiscipline.
- B. Lack of schooling
- C. Failures in housing construction
- D. Impacts of drought
- E. Unwillingness of people to reforest required areas.

A relevant factor among the social determinants of learning is related to the sociometric situation or status of individuals and groups. An analysis of the learning results showed, from the point of view of the academic average with the nine groups, that the worst group was the 7th K, the intermediate or regular 8th C and the most relevant 9th A, the Kruskal - Wallis test showed these significant differences from the academic point of view ($\chi^2=.246.81$ gl8 $p=0.000$). A comparative analysis of the three-individual average sociometric indicators of each group, as an important factor that intervenes in the quality of education, revealed that there were no statistically significant differences in these indicators: popularity index ($\chi^2=.901$ gl2 $p=0.637$), rejection index ($\chi^2=4.217$ gl2 $p=0.121$), affectivity coefficient ($\chi^2=2.627$ gl2 $p=0.269$). Therefore, the absence of positive or negative leaders verifies that at the individual level the three indicators measured in the three groups did not show significant differences. Thus, the sociometric status of the three groups is very similar, but at the same time, it shows that there are conditions from which it is possible to intervene to strengthen group management as a basis for improving learning. This is confirmed when analyzing the group indicators in each of the groups as shown in Table 4 below.

Table 4. Sociometric indicators of the three groups studied

Studied Groups	Association Index	Coherence Index	Divergence Index
7mo K	0.423	0.478	0.282
8vo C	0.517	0.528	0.113
9no A	0.420	0.486	0.226

Source: Sociometrics test. (Author).

The association index indicates, like the coherence index, by being above 0.4, that conditions exist to seek group cohesion and foster leadership, even when dispersion and absence of relevant leadership are perceived. The fact

that the divergence index or coefficient is below 0.25 in the 8th and 9th-grade groups shows the aforementioned potentialities. In the case of the 7th-grade group, although the divergence is somewhat higher, if we understand the characteristics of adolescence, the conflicts that occur when passing from primary to secondary education, and the fact of the high level of overcrowding that these groups present, only coherent action is required from the group of teachers who work directly with them, to improve these indicators.

RESULTS DISCUSSION

Even though in the last lustrums, the economic instability expressed in Angola's GDP, has turned out complex (Quinta & Patatas, 2020), the educational reform advances and the democratizing process which let increased educational rates and human development index (HDI) (Conceição, 2019), caused at the same time, a strengthener of poverty and precariousness which weakened its effects (World Bank, 2019), and an upward social perception of corruption (Moreira, 2020).

Another consequence of the unsteadiness of Angola's economy was unable to avoid the overcrowding process at the classroom level to overcome the high index of enrollment of students by groups with worse on secondary education. Similarly, the economic downturn is reflected in the quality of teacher building and training, as well as in their re-qualification and professional promotion. Teacher shortages remain a constraint, especially in this area of education. Economic circumstances as were abovementioned provoked that requirements suggested by the United Nations and especially by UNESCO, to deploy environmental education at the secondary level, as any could be realized in the groups studied, at the school of the Barrio 70, were not taken into count permanently.

The study confirms that having a strong theory does not mean the possibility of deploying a good practice. Although the school curriculum declares constructivism as the main theory for teaching-learning and interdisciplinarity, in practice, with exceptions, deep-rooted positivism prevails, which is complemented by diverse and adverse impacts of neoliberal globalization, which dangerously opens ways to reinforce colonialist thinking (Sibanda & Young, 2020). Theoretical weaknesses explain fragilities in pedagogical and didactic management (Sajjanhar et al., 2020), the absence of little contextualization of knowledge (Wright et al., 2021), absence of dialogues, weak approach to community and environmental issues.

The influences of climate change expressed in the impacts of the Cold Current of the Gulf of Benguela, on the

city, the province, the nation, and the entire region in the physical, biological, socioeconomic, and environmental fields, become more noticeable and relevant, and therefore the imperative to address such contents from all school grades and types of teaching. The philosophical theoretical bases of the curriculum (Quinta & Patatas, 2020) open possibilities to integrate these realities, to improve the training processes in the teaching bodies, to increase the commitments of teachers and students with the essential changes that reality imposes on education and the necessary concreteness of overcoming lags, making use of science, promoting a break among teachers in attitudes towards its use and the deployment of the necessary changes. From environmental education in secondary schools, it is necessary to encourage the promotion of collaborative leadership among institutions at the level of these schools located in the vicinity (Schlebusch, 2020). Environmental education has to advance in the quality of teaching and learning (Veleepini et al., 2018), articulating coherently and in a dialectic accessible to the context as an essential element to achieve meaningful learning.

In the Benguela province, as in the nation of Angola and the African continent, environmental education must achieve cognitive efficacy, as a basis for breaking the influences of cultural colonialism (Stapleton, 2020) and its reflection in a rote, banking type of learning (Sibanda & Young, 2020). Only from this perspective can the post-colonial curriculum assume its emancipatory nature (Wright et al., 2021), move towards an inclusive, participatory, post-colonial curriculum, with multi- and interdisciplinary approaches, with a critical approach towards society, individuals, and the public, with defined gender perspectives. From this perspective, the combination of theoretical-practical activities, where even ludic contents can be combined (Nieves Chávez & Olvera Pantoja, 2020) in favor of commitments and ethical coherence in behaviors.

In correspondence with the results and the theoretical perspectives that is assumed, a set of principles for action are proposed in correspondence with the basic philosophy of the curriculum for secondary education and the requirements of environmental education in the specific context of the province of Benguela, which also corresponds to what is revealed in the international literature and what is required by UNESCO. Among the principles that can best and most intensely contribute to subverting the deficits found, the following are highlighted:

A. Encourage training processes that promote and stimulate curricular innovation, from interdisciplinarity, linking theory with practice, multi and interculturality, and linking education with life.

- B. Undertake seminars and lectures with students and teachers about environmental issues.
- C. Create circles of interest and encourage activities of a playful nature related to the protection and care of the environment.
- D. Build small, simple, and attractive projects that demonstrate in practice the need for education and subject contents to be articulated with environmental education processes.
- E. Promote contests of readings, photography, videos, painting, sculpture, related to the environmental problems of the area.
- F. Stimulate the creation of community work projects with joint activities of students and teachers of all grades, all subjects, together with religious leaders and social organizations and NGOs in the area.
- G. Stimulate social activities of cleaning and sanitization of residential areas, of social use and in immediate space to the educational institution, with students, teachers, families, religious leaders and communities, around the educational institution and other areas of residence, as in the coastline.

CONCLUSIONS

The environmental education in the secondary school of the city of Benguela, as in Africa and other latitudes, intervenes as a transcendental component in the formation of the new generations. However, the requirements for an environmental education demand, especially at the stage of adolescence and youth, a high theoretical and scientific level to articulate contents and pedagogical and didactic positions that correspond to the principles indicated by UNESCO and recognized by scientific experiences valued internationally. The study verifies that in high school and the three grades analyzed, environmental education is characterized by being shallow, systematic, uncritical of the environmental problems of the studied scenario, and presenting inconsistencies.

The deficiencies shown in the low academic average indexes of the nine groups studied correspond to the absence of an adequate contextualization of teaching-learning, disarticulation of educational practices from local-community traditions and belief systems, ignorance of fragilities and potentialities in group dynamics, the influences of a banking type of education, rote learning and the consequent relevant influence of cultural colonialism, amid a postcolonial curriculum with great possibilities for the deployment of creativity and innovation. The proposal formulated by considering these deficits is placed in potential conditions to subvert these limitations. The conclusions verify the starting hypothesis insofar as the quality

of education constitutes the basis for the deployment of environmental education.

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