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# Environmental Literacy in Morocco: Uncovering the Knowledge /Attitude Gap in Environmental Education

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**ABSTRACT:** This study investigates the relationship between environmental knowledge and attitudes among Moroccan secondary school students. It aims at evaluating the effectiveness of environmental education (EE) in fostering comprehensive environmental literacy. Using a quantitative research design, data was collected from 524 students through a structured questionnaire to assess their environmental knowledge and three dimensions of attitudes: affective, verbal, and behavioral commitment. The results reveal a noticeable imbalance between these dimensions. While students exhibit high levels of affective concern and verbal support for environmental protection, their knowledge, particularly conceptual understanding, remains limited, and their engagement in environmentally responsible practices, especially at the community level, is weak. Correlation and ANOVA analyses indicate no statistically significant relationships between knowledge and attitude components. Furthermore, only minor differences are observed across demographic variables, indicating that these domains likely develop independently. These results point to a form of "superficial environmental awareness," where positive attitudes are not grounded in sufficient cognitive understanding or translated into action. The study situates these findings within the broader context of Moroccan education, emphasizing structural constraints like fragmented curricula, inadequate teacher training, and limited experiential learning opportunities. It concludes by advocating for more integrated, learner-centered, and practice-oriented approaches to EE that effectively connect knowledge, values, and behavior. The study contributes to ongoing debates on the knowledge–attitude–behavior nexus and offers contextspecific insights for advancing environmental education in developing countries.

**KEYWORDS:** environmental education, knowledge, attitudes, Morocco, secondary education, sustainability

## 1. INTRODUCTION

Environmental education (EE) is widely recognized as a cornerstone of sustainable development which contributes to equipping learners with the knowledge, skills, values, and attitudes necessary to address both global and local environmental challenges (Leal Filho et al., 2021; Szczytko et al., 2018). In an era marked by climate change, biodiversity loss, resource depletion, and environmental degradation, education systems are increasingly expected to play a transformative role in preparing individuals to engage critically with environmental issues and contribute to sustainable solutions. EE, therefore, extends beyond the transmission of factual knowledge to include the development of environmental awareness, ethical responsibility, and active participation in environmental protection (Stevenson et al., 2017). Within secondary education, EE is particularly significant as it targets adolescents at a formative stage of cognitive, emotional, and social development. At this level, students begin to construct more complex understandings of environmental systems and develop attitudes that can influence lifelong behaviors (Otto & Pensini, 2022). Effective EE at the secondary level is thus essential for fostering environmental literacy, which encompasses not only knowledge of ecological concepts but also the capacity to think critically, make informed decisions, and engage in proenvironmental actions. However, achieving these outcomes remains a challenge, particularly in developing countries where educational systems face structural and contextual constraints.

Developing countries, including Morocco, encounter specific obstacles in implementing effective EE. These challenges include socio-economic disparities, limited access to educational resources, overcrowded classrooms, and competing curricular priorities (Mliless & Larouz, 2018; UNDP, 2016). In many cases, environmental topics are integrated into existing subjects rather than taught as an independent discipline, which can lead to fragmented and inconsistent coverage. Furthermore, limited teacher training and insufficient pedagogical support often hinder the effective delivery of EE, reducing its potential impact on students' learning outcomes. In Morocco, environmental education is embedded within several subjects, notably geography, life and earth sciences, and English language teaching (ELT) (Laaloua, 2022a, 2022b). While this interdisciplinary approach has the potential to promote holistic understanding, previous research has shown that environmental topics are frequently superficially addressed. It has been proved that it lacks depth, coherence, and continuity across school grade levels (Laaloua, 2022a; Agorram et al., 2009). In this

regard, textbook analyses reveal that environmental content is often presented in isolation, with limited emphasis on critical thinking, problem-solving, or the application of knowledge to real-life environmental issues.

In addition to curricular limitations, teachers play a crucial role in mediating EE outcomes. Studies indicate that Moroccan teachers perceive the integration of EE as insufficient and constrained by various factors such as lack of training, limited instructional time, and inadequate teaching materials (Laaloua, 2022c; El Moussaouy et al., 2014). As a result, EE is often delivered through traditional, teacher-centered approaches that prioritize content coverage over student engagement and experiential learning. This pedagogical limitation reduces opportunities for students to actively construct knowledge and develop meaningful connections with environmental issues.

Research on Moroccan students' environmental learning outcomes has revealed a consistent and significant pattern. While adolescents tend to exhibit positive attitudes toward environmental protection, their environmental knowledge remains limited (Laaloua, 2023; Sayad et al., 2015). This apparent contradiction suggests a disconnection between the affective and cognitive dimensions of environmental learning. Students may express concern for environmental issues and endorse pro-environmental values, yet they tend to lack the conceptual understanding necessary to analyze environmental problems or propose informed solutions. This phenomenon, often described as "superficial environmental awareness," highlights the limitations of educational approaches that emphasize awareness without fostering deep understanding (Faize & Akhtar, 2020; Kollmuss & Agyeman, 2019).

The relationship between environmental knowledge and attitudes has been widely debated in the literature. Traditional models, such as the Knowledge–Attitudes–Practices (KAP) framework, assume a linear progression in which knowledge leads to attitudes and ultimately to behavior. However, empirical evidence suggests that this relationship is more complex and contextdependent. Attitudes may be shaped by social norms, cultural values, and media exposure, independently of formal education, while knowledge acquisition depends heavily on curriculum design and teaching practices. Understanding this relationship within specific educational contexts is therefore essential for designing effective EE interventions.

In Morocco, contextual factors play a particularly important role in shaping students' environmental literacy. Socio-economic inequalities, urban–rural disparities, and variations in school resources influence both access to quality education and opportunities for experiential learning. Students in urban areas may benefit from greater exposure to environmental initiatives and extracurricular activities, whereas those in rural settings may face constraints that limit their engagement with environmental issues. Cultural practices and family influences also contribute to shaping students' attitudes and behaviors, sometimes reinforcing environmental values independently of formal schooling (UNDP, 2016; Laaloua, 2023).

Given these complexities, there is a clear need for empirical research that examines both the cognitive and affective dimensions of EE within the Moroccan context. While previous studies have explored textbooks, teacher perceptions, or student knowledge separately (Laaloua, 2022a, 2022b, 2022c, 2023), fewer studies have investigated the relationship between environmental knowledge and attitudes within the same population. Addressing this gap is essential for understanding the effectiveness of current EE practices and identifying areas for improvement. In this context, the present study aims to investigate the environmental knowledge and attitudes of Moroccan secondary school students. The study seeks to determine whether positive affective dispositions are accompanied by adequate cognitive understanding. Specifically, the study seeks to answer the following research questions:

1. What is the level of environmental knowledge among Moroccan secondary school students?
2. What are students' attitudes toward environmental protection?
3. What is the relationship between environmental knowledge and attitudes?

This study contributes to both theoretical and practical understandings of environmental education by situating its investigation within the broader context of Moroccan educational reforms and environmental challenges. It builds on previous research on textbooks, teacher perceptions, and student outcomes (Laaloua, 2022a, 2022b, 2022c, 2023). By providing empirical evidence on the knowledge–attitude dynamic, the study offers insights that can inform curriculum development, teacher training, and policy initiatives aimed at strengthening environmental literacy in Morocco and similar developing contexts.

## 2. LITERATURE REVIEW

This literature review examines the theoretical and empirical foundations of environmental education research, with particular emphasis on the KAP model, students' environmental knowledge and attitudes, and the contextual factors shaping environmental learning outcomes in Morocco. The review synthesizes international and Moroccan scholarship to identify major debates, methodological limitations, and gaps addressed by the present study.

### 2.1 Theoretical and Empirical Perspectives on Environmental Education

EE is fundamentally concerned with the development of learners' cognitive, affective, and behavioral competencies, which together constitute environmental literacy (Stevenson et al., 2017; Szczytko et al., 2018). One of the most widely used frameworks to conceptualize this process is the KAP model, which posits a sequential relationship between these components. According to this model, individuals first acquire knowledge about environmental issues, which shapes their attitudes, values, and beliefs, and ultimately leads to the adoption of proenvironmental behaviors (Kollmuss & Agyeman, 2019). The KAP model has been influential

in guiding both research and practice in EE, particularly in the design of curricula and interventions aimed at promoting sustainable behavior. It assumes that increasing knowledge will lead to positive attitudes and, subsequently, to environmentally responsible actions. However, this linear progression has been increasingly challenged by empirical research. Studies have shown that the relationship between knowledge, attitudes, and behavior is often complex, non-linear, and mediated by contextual factors such as social norms, cultural values, and situational constraints.

In particular, several studies have highlighted the phenomenon of "superficial environmental awareness," where individuals express strong concern for environmental issues without possessing adequate knowledge or engaging in consistent pro-environmental behavior (Faize & Akhtar, 2020; Otto & Pensini, 2022). This suggests that attitudes can be shaped independently of formal knowledge acquisition, often influenced by media exposure, societal discourse, or moral values. Consequently, the KAP model, while useful, may oversimplify the dynamics of environmental learning, especially in contexts where educational systems face structural limitations. Within the Moroccan context, the applicability of the KAP model demands critical scrutiny. While socialization and exposure to environmental narratives can foster positive environmental attitudes among students, their knowledge acquisition hinges significantly on curriculum quality, teaching practices, and access to resources. This raises pertinent questions about the extent to which EE programs in Morocco effectively integrate cognitive and affective dimensions and whether they facilitate the transition from awareness to informed action.

Research on environmental attitudes among secondary school students consistently shows that adolescents tend to exhibit high levels of concern for environmental issues, particularly in relation to pollution, climate change, and conservation (Stevenson et al., 2017; Szczytko et al., 2018). These attitudes are often shaped by a combination of formal education, media influence, and social interactions, reflecting broader societal awareness of environmental challenges. In the Moroccan context, studies have similarly found that students express positive affective and verbal commitment toward environmental protection (Laaloua, 2023). This suggests that environmental values are being communicated effectively at a general level, either through school curricula or through informal channels such as family practices and public discourse. Students often recognize the importance of protecting natural resources and express willingness to adopt environmentally responsible behaviors. However, the literature also indicates that attitudinal commitment does not necessarily translate into consistent behavior. Clarke (1996) and Bickman (1972) argue that while attitudes can influence behavior, they are often insufficient predictors in the absence of enabling conditions. Factors such as lack of opportunities for action, limited institutional support, and socio-economic constraints can hinder the translation of positive attitudes into practice. In developing contexts, including Morocco, these barriers are particularly pronounced, resulting in a gap between what students say and what they actually do in environmental contexts. While environmental attitudes tend to be positive, research consistently highlights low levels of environmental knowledge among secondary school students, particularly in developing countries. Environmental knowledge encompasses both factual knowledge (e.g., understanding of pollution sources or renewable energy) and conceptual knowledge (e.g., ecological systems, sustainability principles, and human– environment interactions).

In Morocco, studies have shown that students' environmental knowledge is often limited and unevenly distributed across topics (Laaloua, 2023; Sayad et al., 2015). Textbook analyses reveal that environmental content is frequently fragmented and lacks conceptual coherence, making it difficult for students to develop a comprehensive understanding of environmental issues (Laaloua, 2022a, 2022b). For example, geography and ELT textbooks may include references to environmental problems, but these are often presented descriptively rather than analytically. This lack of analytical approach, coupled with limited emphasis on cause-effect relationships and critical thinking, further contributes to the students' limited understanding of environmental issues. This pattern is consistent with findings from other contexts. Studies in Lebanon (Makki et al., 2003), Europe (Kuhlemeier et al., 1999), and Asia (Faize & Akhtar, 2020) indicate that students frequently demonstrate awareness of environmental issues but lack deeper understanding of ecological processes and sustainability concepts. Such deficiencies limit students' ability to engage critically with environmental challenges and to apply their knowledge in real-world contexts.

The relationship between environmental knowledge and attitudes has been widely debated in the literature, with mixed findings. While some studies support the KAP model's assumption of a positive relationship, others report weak or non-significant correlations between knowledge and attitudes (Arcury, 1990; Makki et al., 2003). These inconsistencies suggest that the relationship is influenced by contextual and mediating variables. In Morocco, Laaloua (2023) found a weak correlation between students' environmental knowledge and attitudes, indicating that higher levels of knowledge do not necessarily correspond to stronger pro-environmental attitudes. This result aligns with international research showing that attitudes may be shaped by external influences such as media, cultural norms, and social expectations, rather than by formal education alone (Leal Filho et al., 2021). At the same time, some studies suggest that knowledge can play a significant role when combined with experiential learning and personal relevance (Liefländer & Bogner, 2016). This highlights the importance of integrative educational approaches that connect knowledge acquisition with meaningful experiences and real-life applications. In the absence of such approaches, students may develop fragmented knowledge and superficial attitudes that do not translate into informed decision-making or behavior.

### 2.2 Curriculum and Pedagogical Factors in Morocco

The disconnect between environmental knowledge and attitudes among students can be largely attributed to curricular and pedagogical factors. In Morocco, environmental education is integrated into multiple subjects, but this integration is often

inconsistent and lacks coherence (Laaloua, 2022a, 2022b). Textbooks tend to present environmental topics in isolation, without establishing connections between concepts or encouraging interdisciplinary understanding. Teachers play a central role in mediating curriculum content, yet studies indicate that many Moroccan teachers feel insufficiently prepared to teach environmental topics effectively (Laaloua, 2022c; El Moussaouy et al., 2014). Challenges include limited training in EE, lack of instructional resources, and pressure to cover extensive curricula within constrained timeframes. As a result, teaching practices often rely on traditional, teacher-centered methods, which limit student engagement and reduce opportunities for inquiry-based or experiential learning.

International research emphasizes that effective EE requires active learning strategies, such as project-based learning, fieldwork, and community engagement, which allow students to apply knowledge and develop practical skills (Otto & Pensini, 2022; Szczytko et al., 2018). The absence of such approaches in many Moroccan classrooms contributes to the persistence of the knowledge–attitude gap.

### 2.3 Research Gaps and Study Contribution

Although a growing body of research has examined EE in Morocco, most studies have focused on individual components of the educational process, such as textbook content (Laaloua, 2022a, 2022b), teacher perceptions (Laaloua, 2022c), or student knowledge levels (Laaloua, 2023). While these studies provide valuable insights, they do not fully capture the interrelationship between knowledge, attitudes, and contextual factors within the same population. Moreover, limited attention has been given to the empirical assessment of the knowledge–attitude relationship in Moroccan secondary education, particularly using integrated quantitative measures. There is also a need to contextualize findings within broader socio-cultural and educational frameworks, taking into account factors such as urban–rural disparities, resource availability, and policy implementation.

The present study aims to address these gaps by conducting a comprehensive analysis of both environmental knowledge and attitudes among Moroccan secondary school students.

Additionally, it explores the relationship between these variables. By drawing upon insights from previous research on curricula, textbooks, and teacher perceptions, this study provides a more holistic understanding of environmental education outcomes. Consequently, it contributes to the development of more effective environmental education strategies in Morocco and similar contexts.

## 3. METHODOLOGY

This study employed a convergent parallel mixed-method design to investigate Moroccan secondary school students' environmental knowledge and attitudes. The quantitative component constituted the primary methodological approach and involved the administration of structured questionnaires, while qualitative insights were drawn from previous analyses of Moroccan curricula and textbooks (Laaloua, 2022a, 2022b, 2023). The study was conducted in secondary schools in Agadir, Morocco, and involved 524 students enrolled in grades 10 – 12 across public and private institutions. A stratified random sampling technique was used to ensure representation across gender, grade level, school type, and academic stream.

Data was collected using a structured questionnaire comprising two sections. The first section measured environmental attitudes through 28 Likert-scale items covering affective, verbal, and behavioral dimensions. The second section assessed environmental knowledge through 19 multiple-choice questions, including factual and conceptual items. The questionnaire was translated into Arabic and pilot-tested with 40 students prior to administration. Reliability analysis indicated satisfactory internal consistency, with Cronbach's alpha coefficients of 0.87 for the attitudes scale and 0.78 for the knowledge scale (Laaloua, 2023).

Data collection was conducted during regular classroom sessions. Participation was voluntary, informed consent was obtained, and anonymity was ensured throughout the study. Quantitative data were analyzed using SPSS version 26. Descriptive statistics (means, standard deviations, frequencies, and percentages) were used to assess students' levels of environmental knowledge and attitudes. Inferential analyses included Pearson correlation tests, independent-samples t-tests, and one-way ANOVA to examine relationships and group differences across demographic variables.

## 4. RESULTS

### 4.1 Students' Environmental Attitudes

The analysis of students' environmental attitudes reveals an overall positive orientation toward environmental issues, although important variations emerge across the different dimensions of commitment. As shown in Table 1, the affective component recorded a relatively high mean score ($M = 3.87$, $SD = 0.79$), indicating that students generally express concern about environmental degradation and the protection of natural resources. This suggests that environmental awareness is present at the emotional level, with many students recognizing the importance of preserving the environment for future generations. The highest scores were observed in verbal commitment ($M = 4.21$, $SD = 0.74$), reflecting strong agreement with proenvironmental statements. This indicates that students are highly willing to endorse environmental protection at a declarative level. However, this strong verbal support does not necessarily translate into consistent behavior. In contrast, actual commitment shows a clear divergence between private and public practices. While home-based behaviors are moderately practiced ($M = 3.05$, $SD = 0.82$), community-based engagement

remains low (M = 2.15, SD = 0.81). This suggests that environmental practices are more likely to occur within familiar settings, such as the household, but are less frequently extended to broader social or civic contexts.

**Table 1. Descriptive Statistics for Environmental Attitudes**

| Attitude Component | Mean | SD | Interpretation |
|---|---|---|---|
| **Affective Commitment** | 3.87 | 0.79 | Positive |
| **Verbal Commitment** | 4.21 | 0.74 | Very Positive |
| **Actual Commitment (Home)** | 3.05 | 0.82 | Moderate |
| **Actual Commitment (Community)** | 2.15 | 0.81 | Low |

### 4.2 Students' Environmental Knowledge

The results of the environmental knowledge test indicate generally low levels of understanding among students. The overall mean score was 5.71 out of 19 (SD = 2.70), suggesting that most students possess only limited knowledge of environmental concepts. As illustrated in Table 2**,** the majority of students are concentrated in the lower score ranges, with 37.8% scoring between 0 and 4 and 44.3% scoring between 5 and 8. Only a small proportion of students achieved higher scores, with 8.76% scoring between 9 and 12 and an equal percentage reaching the highest range. These results indicate that more than 90% of students scored below the average threshold, pointing to a widespread deficiency in environmental knowledge.

**Table 2. Distribution of Environmental Knowledge Scores**

| Knowledge Score Range | Frequency | Percentage |
|---|---|---|
| **0–4** | 198 | 37.8% |
| **5–8** | 232 | 44.3% |
| **9–12** | 47 | 8.76% |
| **13–19** | 47 | 8.76% |
| Total | 524 | 100% |

A deeper analysis reveals a distinction between factual and conceptual knowledge. Students performed relatively better on factual questions, such as identifying pollution types, but struggled significantly with conceptual questions related to ecological processes and sustainability. This suggests that students' knowledge remains superficial and lacks the depth required for critical environmental understanding.

### 4.3 Relationship Between Environmental Knowledge and Attitudes

To explore the relationship between environmental knowledge and attitudes, Pearson correlation analysis was conducted. The results, presented in Table 3, indicate weak and statistically nonsignificant relationships between knowledge and all attitude components. The correlation between knowledge and affective commitment was positive but weak (r = 0.12), while correlations with verbal commitment (r = 0.08) and actual commitment (r = 0.05) were negligible. These findings suggest that higher levels of environmental knowledge are not associated with stronger environmental attitudes or behaviors among the students.

**Table 3. Correlation Between Environmental Knowledge and Attitudes**

| Variables | Affective Commitment | Verbal Commitment | Actual Commitment |
|---|---|---|---|
| **Environmental Knowledge** | 0.12 (ns) | 0.08 (ns) | 0.05 (ns) |

*Note: ns = not statistically significant (p > 0.05)*

To sum up, the integration of these results reveals a consistent pattern. Students demonstrate strong environmental concern and express high levels of verbal commitment, yet their knowledge remains limited and their actual engagement in environmental activities is relatively low. The absence of a significant relationship between knowledge and attitudes further highlights the disconnect between cognitive and affective dimensions of environmental education. These findings suggest that environmental learning outcomes are fragmented, with attitudes developing independently of knowledge and not effectively translating into behavior.

### 4.5 Group Differences in Environmental Knowledge and Attitudes

To further explore variations in students' environmental knowledge and attitudes, inferential analyses were conducted using independent samples t-tests (for gender) and one-way ANOVA (for academic stream)**.** These analyses aimed to determine whether statistically significant differences exist across demographic and academic variables.

#### 4.5.1 Gender Differences

An independent samples t-test was conducted to compare male and female students in terms of environmental knowledge and attitudes. As shown in Table 4, female students reported slightly higher mean scores in affective and verbal commitment, while male students demonstrated marginally higher scores in environmental knowledge. However, these differences were not statistically significant ($p > .05$) across all variables. This suggests that gender does not play a decisive role in shaping either environmental knowledge or attitudes among Moroccan secondary school students, and that both groups exhibit similar patterns of environmental awareness and understanding.

**Table 4. Gender Differences in Environmental Knowledge and Attitudes (t-test Results)**

| Variable | Male (M ± SD) | Female (M ± SD) | t-value | p-value |
|---|---|---|---|---|
| **Environmental Knowledge** | 5.84 ± 2.68 | 5.59 ± 2.72 | 1.12 | .263 |
| **Affective Commitment** | 3.81 ± 0.82 | 3.93 ± 0.76 | -1.45 | .148 |
| **Verbal Commitment** | 4.18 ± 0.77 | 4.24 ± 0.71 | -0.98 | .327 |
| **Actual Commitment** | 2.61 ± 0.79 | 2.69 ± 0.83 | -1.12 | .261 |

#### 4.5.2 Differences by Academic Stream

A one-way ANOVA was conducted to examine differences in environmental knowledge and attitudes across academic streams (Science, Literature, and Technical). The results, presented in Table 5, indicate statistically significant differences in environmental knowledge across streams **(**$F(2, 521) = 6.84$, $p < .01$). Post-hoc comparisons (Tukey HSD) revealed that students in the science stream scored significantly higher in environmental knowledge than those in literary and technical streams. However, no significant differences were found between literary and technical students. In contrast, differences in environmental attitudes (affective, verbal, and actual commitment) across streams were not statistically significant ($p > .05$), indicating that students' environmental attitudes are relatively consistent regardless of academic specialization.

**Table 5. ANOVA Results for Environmental Knowledge and Attitudes by Academic Stream**

| Variable | Science (M ± SD) | Literature (M ± SD) | Technical (M ± SD) | Fvalue | pvalue |
|---|---|---|---|---|---|
| **Environmental Knowledge** | 6.82 ± 2.51 | 5.31 ± 2.64 | 4.91 ± 2.73 | 6.84 | .001* |
| **Affective Commitment** | 3.91 ± 0.78 | 3.85 ± 0.81 | 3.83 ± 0.79 | 0.56 | .571 |
| **Verbal Commitment** | 4.23 ± 0.72 | 4.19 ± 0.76 | 4.20 ± 0.74 | 0.32 | .726 |
| **Actual Commitment** | 2.71 ± 0.80 | 2.63 ± 0.83 | 2.60 ± 0.81 | 0.88 | .416 |

*Note: *$p < .01$ indicates statistical significance.*

#### 4.5.3 Interpretation of ANOVA Findings

The ANOVA results provide further insight into the knowledge–attitude disconnect identified earlier. While students in scientific streams demonstrate relatively higher environmental knowledge, this advantage does not translate into stronger environmental attitudes or behaviors. This reinforces the conclusion that knowledge alone is insufficient to influence affective or behavioral outcomes. Moreover, the absence of significant differences in attitudes across gender and academic streams suggests that environmental concern is widely shared among students, likely shaped by broader cultural and social influences rather than formal academic specialization. In contrast, knowledge acquisition appears to be more sensitive to curricular exposure, as reflected in the higher scores of science students.

Taken together, the inferential analyses confirm that environmental attitudes are relatively homogeneous across student groups, whereas environmental knowledge varies significantly depending on academic stream. However, even in groups with higher knowledge levels, overall performance remains low, and no meaningful relationship with attitudes is observed. These findings further support the argument that environmental education in its current form does not effectively integrate cognitive and affective dimensions, resulting in fragmented learning outcomes.

## 5. DISCUSSION

The findings of this study present compelling evidence of a persistent knowledge-attitude gap among Moroccan secondary school students. While students express strong affective and verbal commitment to environmental protection, their environmental knowledge, particularly at the conceptual level, is limited. Moreover, their actual engagement in environmental practices, especially in community settings, is low. These results are consistent with previous research conducted in Morocco (Laaloua, 2023; Sayad et al., 2015), as well as international studies highlighting the disconnect between environmental awareness and understanding (Faize & Akhtar, 2020; Otto & Pensini, 2022). The high levels of affective and verbal commitment observed in this study suggest that students are socially and culturally sensitized to environmental issues. This awareness is likely shaped by a combination of school exposure, media discourse, and broader societal narratives emphasizing sustainability and environmental responsibility. As noted by Stevenson et al. (2017), environmental attitudes among adolescents are often influenced by socialization processes and moral frameworks rather than formal knowledge acquisition. In the Moroccan context, this may explain why students are willing to express strong pro-environmental views, as reflected in their high verbal commitment scores, even in the absence of robust conceptual understanding. However, the results also reveal that this attitudinal strength does not translate into consistent environmental behavior, particularly beyond the household level. Students reported moderate engagement in environmentally responsible practices at home but significantly lower participation in community-based activities such as environmental campaigns or volunteering. This finding aligns with earlier work by Kollmuss and Agyeman (2019), who argue that pro-environmental behavior is influenced not only by knowledge and attitudes but also by situational factors, including access to opportunities, social support, and institutional frameworks. In Morocco, the limited availability of structured environmental programs in schools and communities may constrain students' ability to act on their environmental concerns.

The low levels of environmental knowledge, especially in terms of conceptual understanding, are a significant obstacle to the effectiveness of current environmental education practices. While students showed some familiarity with factual information, their performance on conceptual items, such as ecological processes and sustainability principles, was significantly weaker.This pattern suggests that environmental education in Moroccan secondary schools emphasizes surface-level awareness rather than deep learning, a finding consistent with textbook analyses indicating fragmented and descriptive treatment of environmental topics (Laaloua, 2022a, 2022b; Mliless & Larouz, 2018). Without a solid conceptual foundation, students are unlikely to develop the critical thinking skills necessary to analyze environmental problems or engage in informed decision-making.

The inferential analyses further reinforce the complexity of the knowledge–attitude relationship. The absence of statistically significant correlations between environmental knowledge and all attitude components confirms that knowledge and attitudes are largely independent constructs in this context. This finding challenges the linear assumptions of the KAP model and supports more recent perspectives emphasizing the non-linear and context-dependent nature of environmental learning. Students with higher levels of knowledge did not exhibit significantly stronger attitudes or behaviors, while many students with limited knowledge expressed strong pro-environmental views. This reinforces the notion of "superficial environmental awareness," where attitudes are shaped by external influences rather than grounded in cognitive understanding (Faize & Akhtar, 2020).

The ANOVA results provide additional insight into the structural dimensions of this issue. While students in scientific streams demonstrated significantly higher levels of environmental knowledge compared to their peers in literary and technical streams, these differences did not extend to environmental attitudes or behaviors. This finding suggests that increased exposure to scientific content does not necessarily lead to stronger environmental engagement, highlighting the limitations of content-based approaches to environmental education. Even among science students, knowledge levels remained relatively low, indicating that the issue is not confined to specific academic tracks but reflects broader systemic challenges in curriculum design and implementation. Similarly, the absence of significant gender differences in both knowledge and attitudes suggests that environmental awareness is relatively uniform across student populations, likely influenced by shared cultural and educational experiences. This homogeneity in attitudes further supports the argument that environmental concern is socially constructed, while knowledge acquisition depends more directly on educational structures and pedagogical practices.

Taken together, these findings suggest several interconnected systemic challenges in Moroccan environmental education. Firstly, the curriculum seems to lack coherence and depth, presenting environmental topics in a fragmented manner that hinders students' conceptual understanding. Secondly, teaching practices remain predominantly teacher-centered, which limits opportunities for active learning, critical inquiry, and student engagement (Laaloua, 2022c). Thirdly, the absence of experiential learning opportunities, such as fieldwork, project-based learning, and community engagement, restricts students' ability to connect their knowledge with real-world applications (Otto & Pensini, 2022; Szczytko et al., 2018).

In addition to educational factors, contextual influences play a significant role in shaping students' environmental literacy. Socio-economic disparities, differences in school resources, and urban–rural inequalities affect access to quality education and extracurricular opportunities. Students in urban areas may benefit from greater exposure to environmental initiatives and resources, while those in rural areas face structural constraints that limit their engagement. Cultural norms and family practices also contribute to shaping environmental behaviors, particularly within the home context, where students reported higher levels of engagement. These findings are consistent with broader research emphasizing the importance of social and contextual factors in environmental

learning (UNDP, 2016; Leal Filho et al., 2021). By integrating findings from textbook analyses, teacher perception studies, and student assessments (Laaloua, 2022a, 2022b, 2022c, 2023), this study provides a comprehensive understanding of environmental education outcomes in Morocco. The results clearly demonstrate that current educational practices are more effective in fostering awareness and attitudes than in developing knowledge and action-oriented competencies. This imbalance limits the overall effectiveness of environmental education and underscores the need for a more integrated and holistic approach.

To address these challenges, environmental education in Morocco must move beyond awarenessraising toward deep, transformative learning that integrates cognitive, affective, and behavioral dimensions. This requires curricular reform to ensure coherence and conceptual depth, enhanced teacher training to support innovative pedagogical approaches, and the incorporation of experiential learning opportunities that enable students to apply their knowledge in real-world contexts. Without such reforms, the knowledge–attitude gap identified in this study is likely to persist, limiting the potential of education to contribute meaningfully to sustainable development.

## 6. CONCLUSIONS

This study set out to examine the relationship between environmental knowledge and attitudes among Moroccan secondary school students, with the aim of assessing the effectiveness of current environmental education (EE) practices. The findings provide clear evidence of a persistent and structurally rooted knowledge–attitude gap. While students demonstrate high levels of affective and verbal commitment to environmental protection, their environmental knowledge remains limited, particularly in terms of conceptual understanding. Furthermore, their actual participation in environmental practices, especially at the community level, is weak. Moreover, the lack of statistically significant correlations between knowledge and attitudes, along with the findings of the ANOVA analyses, suggests that these dimensions develop independently rather than interactively. This challenges linear models like the KAP framework. The results further reveal that although students in scientific streams exhibit relatively higher levels of environmental knowledge, this advantage does not translate into stronger attitudes or behaviors. Similarly, the lack of significant gender differences suggests that environmental concern is broadly shared across student populations, while knowledge acquisition remains uneven and insufficient. These findings point to a fundamental limitation in the current EE system, which appears to be more effective in fostering general awareness and socially desirable attitudes than in developing deep cognitive understanding and action-oriented competencies. The prevalence of what can be described as “superficial environmental awareness” underscores the need to move beyond declarative learning toward more meaningful and transformative educational approaches.

The study highlights several interconnected structural factors contributing to this gap. These include fragmented and inconsistently integrated curricula, textbook content that emphasizes descriptive rather than analytical treatment of environmental issues, and predominantly teachercentered pedagogical practices that limit student engagement and critical thinking. In addition, the lack of experiential learning opportunities – such as project-based activities, fieldwork, and community involvement – restricts students’ ability to translate knowledge and attitudes into practice. These educational limitations are further compounded by broader contextual factors, including socio-economic disparities, uneven distribution of resources, and differences between urban and rural educational environments.

In light of these findings, the study underscores the need for a comprehensive and systemic reform of environmental education in Morocco. First, curricula should be redesigned to ensure coherent and interdisciplinary integration of environmental topics, with a stronger emphasis on conceptual understanding, systems thinking, and problem-solving skills. Second, teacher professional development should be prioritized to equip educators with the pedagogical tools necessary to implement student-centered, inquiry-based, and experiential learning approaches. Third, educational institutions should create and support opportunities for active student engagement, including environmental clubs, community projects, and partnerships with local organizations, in order to bridge the gap between knowledge and action. Finally, a multistakeholder approach involving policymakers, educators, families, and civil society is essential to reinforce environmental learning beyond the classroom and to foster a culture of sustainability.

Despite its contributions, this study has several limitations that should be acknowledged. The sample was geographically limited to Agadir and its surrounding areas, which may affect the generalizability of the findings to other regions of Morocco. The reliance on self-reported measures for attitudes and behaviors introduces the possibility of social desirability bias, while the cross-sectional design limits the ability to draw conclusions about causal relationships or changes over time. Future research should address these limitations by employing nationally representative samples, adopting longitudinal designs to track the development of environmental literacy, and incorporating objective behavioral measures. In addition, further studies should explore the impact of specific educational interventions aimed at integrating cognitive, affective, and behavioral dimensions of EE.

In conclusion, this study demonstrates that while Moroccan secondary school students are aware of and concerned about environmental issues, current educational practices are insufficient to equip them with the knowledge and skills required for meaningful engagement. Bridging the knowledge–attitude gap will require not only improvements in curriculum and pedagogy but also a broader transformation of the educational environment to support holistic, action-oriented environmental learning. Such efforts are essential for preparing future generations to respond effectively to environmental challenges and to contribute to sustainable development at both national and global levels.

**REFERENCES**


1) Agorram, B., Caravita, S., Valente, A., Luzi, D., & Margnelli, N. (2009). Knowledge and values in science textbooks concerning complexity in ecological systems and environmental problems: A cross-cultural study on secondary school manuals. *US-China Education Review, 6*(2), 25–37.
2) Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T
3) Arcury, T. A. (1990). Environmental attitude and environmental knowledge. *Human Organization, 49*(4), 300–304. https://doi.org/10.17730/humo.49.4.y6135676n433r880
4) Ardoin, N. M., Bowers, A. W., & Gaillard, E. (2020). Environmental education outcomes for conservation: A systematic review. *Biological Conservation, 241*, 108224. https://doi.org/10.1016/j.biocon.2019.108224
5) Clarke, B. (1996). Environmental attitudes and knowledge of year 11 students in a Queensland high school. *Australian Journal of Environmental Education, 12*, 19–26. https://doi.org/10.1017/S0814062600001580
6) El Moussaouy, A., Abderbi, J. & Daoudi, M. (2014). Environmental education in the teaching and the learning of scientific disciplines in Moroccan high schools. *International Education Studies*, 7(4), 33-46. https://doi.org/10.5539/ies.v7n4p33
7) Faize, F. A., & Akhtar, M. (2020). Addressing environmental knowledge and environmental attitude through scientific argumentation. *Journal of Cleaner Production, 252*, 119825. https://doi.org/10.1016/j.jclepro.2019.119928
8) Hungerford, H. R., Peyton, R. B., & Wilke, R. J. (1980). Goals for curriculum development in environmental education. *The Journal of Environmental Education, 11*(2), 17–22. https://doi.org/10.1080/00958964.1980.9941381
9) Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *The Journal of Environmental Education, 21*(3), 8–21. https://doi.org/10.1080/00958964.1990.10753743
10) Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239–260. https://doi.org/10.1080/13504620220145401
11) Laaloua, H., & Tamer, Y. (2022). Promoting environmental education in Moroccan high school
12) ELT textbooks. *International Journal of Language and Literary Studies, 4*(1), 317– 330. https://doi.org/10.36892/ijlls.v4i1.860
13) Laaloua, H. (2022). Teachers' perceptions of the integration of environmental awareness and knowledge in high school curricula in Morocco. *International Journal of Social Science and Human Research, 5*(5), 1751–1764. https://doi.org/10.47191/ijsshr/v5-i5-25
14) Laaloua, H. (2022). The status of Moroccan high school students' environmental knowledge. *International Journal of Multidisciplinary Research and Analysis, 5*(8), 2098–2108. https://doi.org/10.47191/ijmra/v5-i8-26
15) Laaloua, H. (2023). The role of education in addressing environmental challenges: A study of environmental education integration in Moroccan geography textbooks. *International Journal of Social Science and Human Research, 6*(4), 2317–2325. https://doi.org/10.47191/ijsshr/v6-i4-41
16) Leal Filho, W., Shiel, C., Paço, A., Mifsud, M., Veiga Ávila, L., Brandli, L. L., Molthan-Hill, P., Pace, P., Azeiteiro, U., Vargas, V. R., & Caeiro, S. (2019). Sustainable development goals and sustainability teaching at universities: Falling behind or getting ahead of the pack? *Journal of Cleaner Production, 232*, 285–294. https://doi.org/10.1016/j.jclepro.2019.05.309
17) Mliless, M., & Larouz, M. (2018). An ecolinguistic analysis of environment texts in Moroccan English language teaching textbooks. *International Journal of Research in Environmental Studies, 5*(2), 103–116.
18) Monroe, M. C., Plate, R. R., Oxarart, A., Bowers, A., & Chaves, W. A. (2019). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research, 25*(6), 791– 812. https://doi.org/10.1080/13504622.2017.1360842
19) Otto, S., & Pensini, P. (2017). Nature-based environmental education of children: Environmental knowledge and connectedness to nature together are related to ecological behaviour. *Global*
20) *Environmental Change, 47*, 88–94. https://doi.org/10.1016/j.gloenvcha.2017.09.009
21) Rickinson, M. (2001). Learners and learning in environmental education: A critical review of the evidence. *Environmental Education Research, 7*(3), 207– 320. https://doi.org/10.1080/13504620120065230
22) Sayad, A., Chakib, A., Rouass, M., & Boustani, R. (2015). The status of environment in educational institutions: High schools of Fez, Morocco. *Procedia - Social and Behavioral Sciences, 191*, 2598–2604. https://doi.org/10.1016/j.sbspro.2015.04.687
23) Stevenson, R. B., Brody, M., Dillon, J., & Wals, A. E. J. (Eds.). (2017). *International handbook of research on environmental education*. Routledge.
24) Stern, P. C. (2000). New environmental theories: Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues, 56*(3), 407–424. https://doi.org/10.1111/00224537.00175
25) Szczytko, R., Stevenson, K. T., Peterson, M. N., Bondell, H. D., Nietfeld, J. L., & Strnad, R. L.

26) (2018). Development and validation of the environmental literacy instrument for adolescnets. *Environmental Education Research*, *26*(8), 1127– 1148. https://doi.org/10.1080/13504622.2020.1764358
27) UNDP. (2016). *Promoting sustainable development through more effective civil society participation in environmental governance*. United Nations Development Programme.
28) UNESCO. (2020). *Education for sustainable development: A roadmap*. UNESCO.
29) UNESCO-UNEP. (1978). *Intergovernmental conference on environmental education: Final report (The Tbilisi Declaration)*. UNESCO.

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