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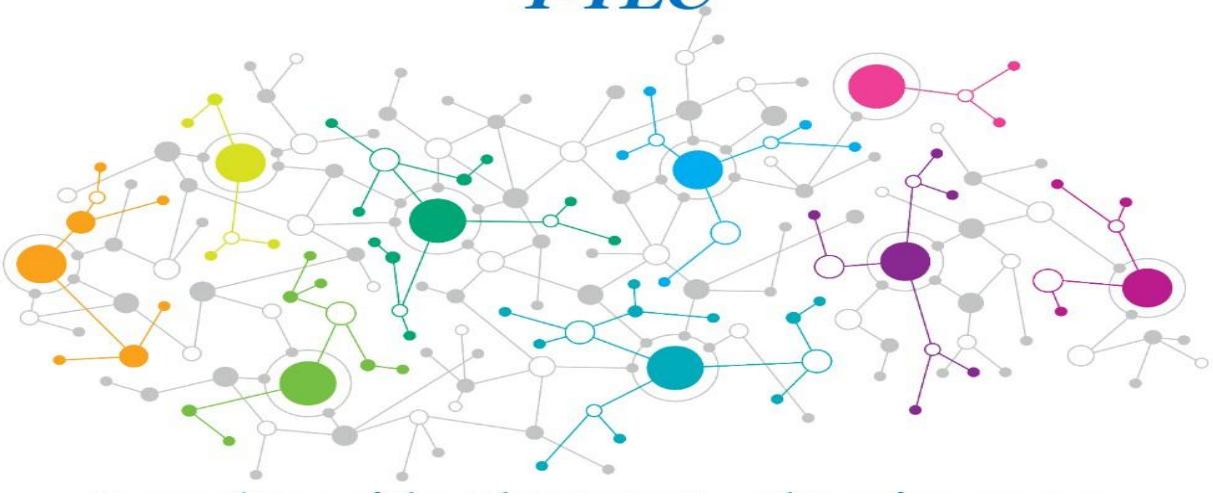

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Promoting Critical Thinking and Communication Skills across STEM and Humanities for University Success in the Oriental Region of Moroccan High Schools

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Abstract

This study investigates how subject areas in high schools of the Oriental region (Jerada, Oujda, Nador,) contribute to university readiness by promoting critical thinking and communication skills. Specifically, the research examines two main research questions: (1) Do STEM high school teachers promote these soft skills as effectively as Humanities teachers? and (2) Are students from rural high schools less prepared in these areas compared to their urban counterparts? Using a quantitative research design, data were collected through a structured questionnaire administered to a representative sample of high school teachers and students across three different regions. The questionnaire was designed to assess the frequency and effectiveness of teaching strategies that aim to cultivate critical thinking and communication skills within different subjects. The findings reveal significant disparities: Humanities teachers tend to implement more interactive and analytical methods that foster soft skills, while STEM teachers often rely on lecture-based instruction. Additionally, students from rural schools report lower preparedness levels in critical

thinking and communication compared to urban students. This study is based solely on data collected through structured questionnaires, which may not fully capture the nuanced practices of classroom instruction and the complexity of soft skills development. Based on these results, the study recommends curricular reforms that integrate targeted modules for soft skills development, enhanced teacher training—especially in STEM disciplines—and increased resource allocation for rural schools.

Keywords: Soft skills, critical thinking, communication skills, STEAM, Humanities, university readiness

1. Introduction

1.1. Background of the Study

The transition from secondary to higher education demands more than academic knowledge; it requires a robust set of soft skills, particularly critical thinking and effective communication. These competencies are essential for engaging with complex academic tasks, formulating independent arguments, and navigating multidisciplinary learning environments (Bailin et al., 1999; Paul & Elder, 2014). In university settings, students are expected not only to absorb and recall information but also to evaluate sources critically, construct evidence-based arguments, and participate in academic discourse. Such expectations highlight the foundational role of soft skills in fostering analytical reasoning and intellectual autonomy.

Globally, educational systems have increasingly emphasized the development of 21st-century skills to prepare students for academic and professional success (Trilling & Fadel, 2009). However, in many contexts, including Morocco, there is growing concern that high school graduates often lack these vital skills upon entering university (Benmokhtar, 2020). This shortfall is especially problematic in first-year university programs, where students frequently encounter difficulties in writing research papers, participating in discussions, and interpreting complex academic texts.

The Moroccan Ministry of National Education has acknowledged the need to integrate transversal competencies into secondary curricula, yet implementation remains uneven across subject areas and regions (Ministère de l'Éducation Nationale, 2021). In particular, disparities between STEM

(Science, Technology, Engineering, and Mathematics) and Humanities education raise critical questions about pedagogical priorities. While Humanities subjects often employ discursive and analytical approaches conducive to soft skill development, STEM disciplines tend to favor content delivery and procedural accuracy (Toledo & Dubas, 2017).

Additionally, the urban–rural divide continues to affect educational outcomes in Morocco. Students in rural areas frequently face resource constraints, teacher shortages, and limited access to enriching learning experiences, all of which may hinder the cultivation of soft skills (World Bank, 2020). As such, the interaction between subject area and geographical context becomes crucial in understanding how Moroccan high schools prepare or fail to prepare, students for the demands of higher education.

1.2. Problem Statement

Despite the recognized importance of soft skills, there is insufficient empirical evidence on how different high school subject areas in Morocco contribute to developing these competencies. Furthermore, little is known about how students' geographical context—specifically urban versus rural settings—affects their preparedness in critical thinking and communication.

1.3. Significance of the Study

This study contributes to the growing body of research on university readiness in developing countries by highlighting the pedagogical and contextual factors that influence students' acquisition of soft skills. Its findings aim to inform policy reforms related to curriculum design, teacher training, and educational equity—particularly in underserved rural areas.

1.4. Aim of the Study

The main objective of this research is to assess how different subject areas in Moroccan high schools influence the development of soft skills essential for university readiness. Specifically, it aims to compare the teaching strategies used by STEM and Humanities teachers in promoting critical thinking and communication, and to evaluate differences in perceived preparedness between rural and urban students.

1.5. Research Questions

This study seeks to answer the following questions:

- Do STEM high school teachers promote soft skills as effectively as Humanities teachers?
- Are students from rural high schools less prepared in these areas compared to their urban counterparts?

2. Literature Review

2.1. Theoretical Framework

2.1.1. Bloom's Taxonomy of Cognitive Levels

Anderson and Krathwohl (2001) proposed six levels within cognitive skill frameworks: Remembering, Understanding, Application, Analysis, Evaluation, and Creation. Analysis, evaluation, and creation are associated with higher-order thinking since they require critical reasoning, interpretation, and synthesis. This taxonomy assists in assessing whether pedagogical approaches adopt a higher-order thinking approach instead of solely memorization.

2.1.2 Hymes'Theory of Communicative Competence

Hymes (1972) developed the communicative competence model to integrate grammar with the functional use of language in social contexts. The competence includes linguistic, sociolinguistic, discourse, and strategic competence (Canale & Swain, 1980). This helps us understand the impact of instruction on the student's ability to express and interpret meaning in dialogue and academic text.

2.2. Conceptual Framework

2.2.1 Critical Thinking

Critical thinking based on Facione (1990) is self-regulatory judgment; it requires reflection on self-processes and rigorous analysis and evaluation. Critical thinking is most directly aligned with levels 4–6 (Analyze, Evaluate, Create), which require judgment, reasoning, and reflection, which in turn are key components of Facione's definition. While Bloom presents a hierarchical hierarchy of cognitive abilities, Facione's model dives into the nature of competent judgment and self-monitoring. Both stress the significance of examining, evaluating, and developing ideas—skills required for academic success and lifelong learning.

2.2.2. Communication Skills

Communication skills refer to the ability to convey, receive, and interpret messages effectively across a range of contexts and for various purposes. These skills encompass verbal and non-verbal communication, active listening, clarity and coherence in expression, interactional strategies, and the ability to adapt language use to different audiences and situations. According to Hymes (1972)**,** effective language use involves more than grammatical accuracy; it also requires an understanding of the social and cultural appropriateness of communication. He introduced the concept of communicative competence to highlight this broader view, emphasizing that speakers must know not only *what* to say, but also *how*, *when*, and *to whom* to say it within specific social contexts.

In the context of higher education, critical thinking and communication skills are widely recognized as essential competencies that transcend disciplinary boundaries. Both are considered cornerstones of academic success, personal development, and employability in the 21st century (OECD, 2018). These skills are not only crucial for students in humanities and social sciences, where analytical discourse is often emphasized, but are equally vital in STEM (Science, Technology, Engineering, and Mathematics) fields, where students are required to solve complex problems, evaluate data, justify methodologies, and present findings clearly and persuasively. Several empirical studies have investigated the interplay and importance of critical thinking and communication skills among university students across various disciplines.

3- Methodology

3.1. Research Design

This study employed a quantitative research design to examine the extent to which Moroccan high schools in the Oriental region promote soft skills; specifically critical thinking and communication, as part of their contribution to university readiness. A descriptive comparative approach was adopted to explore differences in pedagogical practices between subject areas (STEM vs. Humanities) and between geographical contexts (urban vs. rural). This design was deemed appropriate for identifying patterns, assessing teacher and student perceptions, and making generalizations based on statistical evidence.

3.2. Research Setting and Population

The research was conducted in the Oriental region of Morocco, targeting high schools in three main provinces: Jerada, Oujda, and Nador. These provinces were selected due to their demographic diversity, representation of both urban and rural contexts, and accessibility for data collection. The population of interest comprised secondary school teachers and final-year high school students, as these groups are directly involved in preparing learners for higher education.

3.3. Sampling Procedure

A stratified random sampling technique was used to ensure representation across key variables: subject area (STEM vs. Humanities), school location (urban vs. rural), and respondent type (teachers vs. students). A total of 12 high schools were selected; six urban and six rural across the three provinces. From each school, two final-year classes were chosen: one specializing in STEM subjects and the other in Humanities. This resulted in a sample of 390 students and 36 teachers, proportionally divided across the subgroups to maintain balance and comparability.

3.4. Research Instrument

The primary instrument used for data collection was a structured questionnaire, designed to measure the frequency and effectiveness of classroom strategies aimed at fostering critical thinking and communication skills. Separate but parallel versions of the questionnaire were developed for teachers and students. Items were formulated using Likert-scale formats (ranging from 1 = strongly disagree to 5 = strongly agree), ensuring ease of analysis and standardization.

The teacher questionnaire included items on:

- Use of interactive instructional strategies (e.g., debates, group discussions)
- Frequency of open-ended questions and problem-solving tasks
- Assessment methods promoting higher-order thinking

The student questionnaire focused on:

- Perceived development of soft skills in their subject area
- Classroom practices that support critical analysis and oral expression
- Preparedness for university-level communication and reasoning tasks

Both instruments were reviewed by a panel of educational experts and piloted with a small sample (n=20) to ensure **validity** and **reliability**. Minor adjustments were made based on pilot feedback to enhance clarity and relevance.

3.5. Data Collection Procedures

Data collection was carried out during the 2024–2025 academic year. After obtaining official permission from the regional educational authorities and informed consent from participants, questionnaires were administered in-person during regular class sessions. Respondents were assured of the anonymity and confidentiality of their responses. The researcher was present to clarify any queries and ensure the standardized administration of the instrument.

3.6. Data Analysis

Quantitative data were coded and analyzed using SPSS (Statistical Package for the Social Sciences). Descriptive statistics (means, frequencies, and standard deviations) were calculated to summarize the data. Independent samples t-tests were conducted to compare responses between STEM and Humanities teachers and between students from rural and urban schools.

3.7. Ethical Considerations

The study adhered to ethical research standards throughout its implementation. Participants were informed about the purpose of the study, their voluntary participation, and the right to withdraw at any time. Data were collected anonymously and stored securely. No identifying information was reported. The research protocol was approved by the Ethics Committee of the researcher's home institution.

3.8. Limitations of the Methodology

While the use of structured questionnaires allowed for efficient data collection across multiple locations, this method may have limitations in capturing the depth and complexity of classroom practices and the developmental nature of soft skills. Additionally, the reliance on self-reported data introduces potential biases related to social desirability and subjectivity. Future studies may benefit from triangulating these findings through qualitative methods, such as classroom observations or interviews, to gain richer insights.

4- Results

4.1. Questionnaire of the Students

4.1.1. Group 1: Humanities/ Urban

This group of students demonstrates a notable degree of consistency in their responses, as evidenced by their data points being clustered closely around the mean value. The low variation observed within this group indicates that the students shared a strong consensus regarding the approach under consideration.

Table 1

Statements	**Standard Deviation**
I can solve exercises if they are similar to examples explained by my teacher	0.41833
I find it hard to answer questions that are worded differently from class examples	0.57117
I feel confused when I face new types of problems or exercises	0.76578

This homogeneity in responses suggests that the approach was perceived similarly across the group, reinforcing the reliability of their collective viewpoint.

4.1.2. Group 2. Humanities/ Rural

This pattern reflects a student group that is confident with familiar material but experiences more varied responses when dealing with unfamiliar or new problem types.

Table 2

Statement	**Standard Deviation**
I can solve exercises if they are similar to the examples explained by my teacher.	*0.418*
I find it hard to answer questions that are worded differently from class examples.	*0.571*
I feel confused when I face new types of problems or exercises.	*0.766*
I try to understand the reason behind the correct answer, not just memorize it.	*0.972*

The first statement shows the lowest standard deviation (0.418), indicating that students' responses were closely clustered, reflecting strong agreement that they can solve exercises similar to those

taught by their teacher. The second statement, with a slightly higher SD (0.571), suggests some consistency in students' acknowledgement of difficulty when questions are worded differently. The third statement has a higher standard deviation (0.766), showing that students' feelings of confusion about new problems are more varied. The fourth statement has the highest standard deviation (0.972), indicating a broader range of responses. Despite this, the mode of 5 suggests that many students aim to understand underlying reasons rather than just memorize answers.

4.1.3. Group 3: STEM/ Urban

Both groups are quite confident solving exercises similar to class examples, though the first group shows slightly tighter consensus. This group is more divided when expressing difficulty. This group shows more diverse feelings about confusion with new problems, while the previous group responses are more consistent, indicating a clearer shared experience.

Table 3

Statement	Standard Deviation
I can solve exercises if they are similar to the examples explained by my teacher.	0.499
I find it hard to answer questions that are worded differently from class examples.	1.503
I feel confused when I face new types of problems or exercises.	1.030
I try to understand the reason behind the correct answer, not just memorize it.	1.297

Both groups generally prefer understanding reasons rather than memorizing, but the current group's opinions are more dispersed, suggesting individual differences in learning approaches.

4.1.4. Group 4: STEM/ Rural

This group has the highest standard deviation in 2 of 4 items, and overall standard deviations are elevated, indicating this group is the least consistent or most fragmented in learning approaches and attitudes. demonstrates the least agreement, most varied attitudes, and weaker coherence in learning behavior

Table 4

Statement	Standard Deviation
I can solve exercises if they are similar to the examples explained by my teacher.	0.713
I find it hard to answer questions that are worded differently from class examples.	1.096
I feel confused when I face new types of problems or exercises.	1.284
I try to understand the reason behind the correct answer, not just memorize it.	1.096

4.2. Questionnaire of the Teachers

4.2.1. Group 1: Humanities/ Urban

Regarding this group, low standard deviation suggests high agreement or consistency among teachers' responses.

Table 5

	Statement	SD
CT1	I ask students to explain the reasoning behind their answers.	0.53
CT2	I assign tasks that require problem-solving and logical thinking.	0.53
CT3	I ask students to justify their problem-solving steps or conclusions.	0.44
COM1	I encourage students to explain concepts or procedures to peers.	0.87
COM2	I encourage active listening and respectful peer responses.	0.44
COM3	I use questioning techniques that promote student interaction.	0.73

Urban Humanities teachers consistently incorporate critical thinking tasks, such as problem-solving and requiring justification of answers. They show strong and consistent engagement in teaching practices that promote critical thinking. However, there is more variability in communication skill strategies, particularly in peer explanation and interactive questioning.

4.2.2. Group 2: Humanities/ Rural

Teachers in this group demonstrate strong agreement on fostering critical thinking, especially with tasks that require justification (CT3). Communication strategies are less uniformly applied, especially peer explanation (COM1), where responses vary the most.

Table 6

	Statement	SD
CT1	I ask students to explain the reasoning behind their answers.	0.71
CT2	I assign tasks that require problem-solving and logical thinking.	0.50
CT3	I ask students to justify their problem-solving steps or conclusions.	0.00
COM1	I encourage students to explain concepts or procedures to peers.	0.83
COM2	I encourage active listening and respectful peer responses.	0.33
COM3	I use questioning techniques that promote student interaction.	0.50

This suggests some teachers may face constraints or require more support in applying communicative teaching strategies consistently.

4.2.3. Group 3: STEM/ Urban

This group shows moderate consistency overall in implementing critical thinking and communication strategies. There is relatively strong agreement on peer explanation (COM1) and asking for justification (CT3), while practices like encouraging students to explain reasoning (CT1) vary more significantly.

Table 7

	Statement	SD
CT1	I ask students to explain the reasoning behind their answers.	0.73
CT2	I assign tasks that require problem-solving and logical thinking.	0.50
CT3	I ask students to justify their problem-solving steps or conclusions.	0.44
COM1	I encourage students to explain concepts or procedures to peers.	0.44
COM2	I encourage active listening and respectful peer responses.	0.50
COM3	I use questioning techniques that promote student interaction.	0.53

Humanities Teachers (both rural and urban) show greater consistency overall in promoting critical thinking and communication strategies, particularly with justification-based tasks (CT3). STEM Urban Teachers display greater variability, especially in reasoning prompts (CT1) and communication-promoting practices (COM2 and COM3)**.**

4.2.4. Group 4: STEM/ Rural

Across all groups, CT3 (asking students to justify conclusions) shows the lowest variability, suggesting that it's a widely accepted strategy regardless of subject or setting. STEM teachers, especially in rural areas, show the greatest inconsistency in applying reasoning and problem-solving practices (CT1, CT2).

Table 8

	Statement	SD
CT1	Ask students to explain the reasoning behind their answers	0.78
CT2	Assign tasks that require problem-solving and logical thinking	0.83
CT3	Ask students to justify their problem-solving steps or conclusions	0.44
COM1	Encourage students to explain concepts or procedures to peers	0.53
COM2	Encourage active listening and respectful peer responses	0.53
COM3	Use questioning techniques that promote student interaction	0.50

5. Discussion

The analysis of teacher responses across all groups indicates a general consensus on the importance of integrating critical thinking and communication strategies into classroom instruction. Teachers, regardless of subject specialization or geographic setting, reported frequent use of techniques such as prompting students to justify answers, encouraging peer explanation, and fostering active classroom dialogue. According to Bloom's Taxonomy, the results indicate that the teachers implement higher-order thinking skills in their instructional practices.

Conversely, the findings reveal a discrepancy on the students' side. As reviewed in the literature, students enrolled in STEM disciplines frequently do not reach the higher levels of cognitive and communicative competence outlined in Bloom's Taxonomy. This challenge is exacerbated in rural contexts, where students face additional educational disadvantages. This contradiction raises important questions about classroom dynamics, implementation fidelity, and contextual barriers. It highlights the need for further investigation into how teaching practices are received by students and how external factors such as school resources, student-teacher ratios, and local academic culture might mediate the effectiveness of soft skills instruction.

Thus, the significance of this study lies in its ability to surface both pedagogical and structural inequalities in soft skills development. It not only informs curriculum developers and policymakers about the uneven promotion of 21st-century competencies across disciplines and regions but also stresses the need for context-sensitive reforms, such as differentiated teacher training, increased support for rural schools, and performance-based monitoring of skill development. In doing so, the study contributes to broader discussions on educational equity, effective teaching practices, and student preparedness for higher education in Morocco and similar contexts.

6. Implications, Recommendations and Conclusions

In a rapidly evolving global landscape, the ability to think critically and communicate effectively is no longer optional; it is essential. While this study highlights commendable efforts by many teachers, it also uncovers critical gaps that must be addressed. Building an education system that truly prepares all students for higher education and beyond requires more than stated intentions; it

requires targeted reforms, equity-focused interventions, and a renewed commitment to bridging the gap between policy, practice, and student experience. By recognizing the structural and pedagogical barriers faced by rural schools and STEM educators, this study emphasizes the urgency of investing in equitable educational practices that empower every learner. Ultimately, preparing students for the demands of higher education.

In light of the study's findings, it is recommended to implement structured training days and workshops aimed at enhancing students' soft skills; particularly critical thinking, communication, and problem-solving in order to better prepare them for the demands of higher education. These initiatives could take the form of awareness campaigns, skill-building sessions, or extracurricular programs integrated into the school year.

Additionally, it is recommended to invite educational experts, including soft skills trainers and higher education professionals, to visit schools in rural areas. These experts can observe classroom practices, provide guidance, and intervene when necessary to support both students and teachers. Such measures are essential to bridging the gap between secondary education and university expectations, especially for students in under-resourced rural contexts.

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