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ENHANCING ACADEMIC PERFORMANCE IN EMI CONTEXT THROUGH PEDAGOGICAL TRANSLANGUAGING: A MIXED METHODS STUDY

Wahida Yaiche[1]

Abstract

Policymakers in Algeria sought to promote internationalization in higher education through implementing English as a Medium of Instruction (EMI). The pedagogical implications of EMI bumped into substantial obstacles, such as difficulties in teaching content subjects in English and the students' limited proficiency in English. This paper investigates the utility of pedagogical translanguaging in teaching content subjects in English. To this aim, 90 undergraduate students who took content courses in English were nominated from the electrical engineering department at Naama University Center, Algeria. Students were randomly allocated to an EMI-only version of the course (the control group) or a multilingual version of the course (the experimental group). The performance of the students was assessed through final examinations specifically constructed to evaluate both content knowledge and accuracy of academic English usage. Moreover, the researcher conducted interviews with teachers to collect data on whether translanguaging helps students deepen conceptual understanding and communicate it accurately in English. The test results demonstrated that the experimental group students answered statistically more test questions correctly and produced clear written answers compared to students enrolled in the control group. Furthermore, the analysis of the teachers' interviews revealed positive attitudes toward translanguaging. This study advocates for translanguaging practices to effectively address the students' English language proficiency and support their linguistic diversity in the EMI setting for better academic performance.

Keywords: EMI, Academic performance, Translanguaging, Multilingual education.

[1] Dr. Wahida Yaiche, Department of English Language, University of Naama, Algeria. yaiche@cuniv-naama.dz. https://orcid.org/0000-0002-1285-5757

Introduction

English is becoming the universal language in numerous academic fields. Thus, higher education institutions are internationalizing their curricula through Englishisation (Rose & McKinley, 2018). Higher education in Algeria has remarkably undergone a major shift to participate in the globalized world, where English has become the international language. This change means that English has shifted from being taught as a foreign language alongside other disciplinary academic subjects to becoming a medium of instruction for learning and teaching content subjects such as science, mathematics, and business.

EMI implementation in Algeria sought to prepare young students for international scholarships, scientific research publishing, and multicultural employment. According to Macaro (2018), English affords more mobility, movement, and communication than any other competing language. This fact clarifies why higher education globally has selected English as a means of instruction in the majority of its academic disciplines. Touahmia and Bakar (2024) found that the majority of Algerian higher education lecturers and students recognize the significance of English in research and technology.

Notwithstanding the significant implications, EMI adoption comes with substantial challenges and raises concerns regarding its linguistic and academic aspects. These challenges revolve around students' proficiency, pedagogical effectiveness, and the academic achievement of students within EMI programs (Gülle, 2024). EMI is often implemented with the belief that learning an academic subject in English as a second/foreign language ought to be as effective as learning it in the first language, and EMI should benefit students in enhancing their global intercultural competence in addition to improving their English proficiency (Pecorari & Malmström, 2018; Macaro, 2018). However, under certain circumstances, EMI could have a destructive impact on students' academic performance (Bälter et al., 2024). The research highlighted that delivering course content in English only in an EMI setting can have some downsides; thus, the use of the students' first language can mitigate challenges encountered by low English language proficiency students (Pun & Thomas, 2020).

In the context of Algerian higher education, few studies have inquired about teaching approaches within EMI. The majority of the studies

investigated language attitudes, difficulties, and advantages (Senouci & Gacem, 2024; Hamane, 2023; Touahmia & Bakar, 2024; Messeded, 2023; Ouarniki, 2023; Benhamlaoui & Benzadri, 2024). While inquiring about the EMI implementation, most studies reported difficulties with processing both the language and the content simultaneously. The implementation of EMI in Algerian universities deserves closer investigation. Thus, the purpose of the current study was to investigate the use of translanguaging to support both students and teachers in EMI contexts. A crucial aspect of this research is to gain insight into how does the intentional use of translanguaging impact the academic performance of EMI students?

The interest of the current paper is twofold: it anticipates searching the pedagogical practice of translanguaging in EMI as it unfolds in ongoing interactions between students and teachers in higher education classrooms. Further, it tends to prove that translanguaging can uphold academic performance. Principally, higher education in Algeria gives great attention to training EMI teachers, but the direct enactment of the educational reform, along with the teachers' and learners' readiness, brought several issues. The electrical engineering department's pedagogical team at Naama University Center teaches students for three years to get the 'Licence Degree' or 'B.A' in the Anglo-Saxon educational system. Over three years, students study content subjects through EMI. Indeed, teachers receive the content of teaching in the form of limited guidelines. Following the supplied guidelines, the teacher develops the instructional points. The curriculum does not consider any pedagogical practice to deal with the students' limited language proficiency. Thus, translanguaging to support EMI students' language-related difficulties is placed at the heart of research for the present investigation.

As a mixed-methods study, the current classroom experiment has significant benefits in terms of exploring translanguaging as a teaching approach that may enhance EMI students' academic performance. It aims to provide EMI teachers with valuable and evident data based on experimental results. Moreover, the study theorizes that using translanguaging as a scaffolding tool offers teachers a better procedure to cope with the students' limited language proficiency. It struggles, then, to introduce a valuable contribution to the development of EMI in Algerian

higher education. In this respect, the study revolves around the following research questions:

• What might be the effect of translanguaging on EMI students' academic performance?

• To what extent do EMI students show improved academic performance after experiencing pedagogical translanguaging?

• Do EMI teachers favor the use of translanguaging to enhance academic performance?

To address the upraised questions, the researcher outlines a number of objectives. First, the study anticipates that translanguaging needs to be associated with the teaching of subject content to deal with language-related difficulties that students encounter in their EMI courses. In this vein, Gülle (2024) maintained that the pedagogical approach of translanguaging is becoming widely acknowledged for its benefits in EMI settings over monolingual practices. Second, the study recommends translanguaging to develop academic performance among EMI students. According to Macaro (2020), including students' first language is compulsory to develop academic understanding in an EMI setting. Third, the study presumes that EMI students, who study through translanguaging practices, are more likely to develop academic performance.

To analyze the potential advantages of translanguaging on academic performance, the researcher has opted for a particular methodology to discover answers to the research questions. The selected methodology relied on an experimental design to argue meticulously that EMI students' academic performance is improved through translanguaging. The latter assists both teaching and learning, develops students' content comprehension, and promotes cognitive engagement through tolerating the fluid employment of their full linguistic repertoire. The study also tends to criticize the English-only usage in EMI, where language proficiency affects academic achievement.

Review of Literature

EMI in Algeria

The use of the English language to teach academic content in educational settings where the majority of the population does not speak English as their first language is typically referred to as EMI. The objective, in such

educational settings, is content learning rather than language learning, which is usually not an overt educational goal (Curle et al., 2020). In the literature, EMI is defined in a variety of ways. Macaro's (2018) definition is the most often cited one, claiming that EMI is "the use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language (L1) of the majority of the population is not English" (p. 19). The context of this research, Algeria, falls within this explanation.

Throughout the past two decades, EMI adoption in higher education has expanded globally. Much of this growth can be ascribed to policies pertaining to the internationalisation of higher education, which could be realized through the Englishisation of content programs within universities. Therefore, the growing worldwide EMI implementation in higher education was one of the steps that were taken regarding the internationalisation process (Macaro, 2018). This global phenomenon implicates the use of English as an educational language to teach and learn non-language-related academic subjects (Curle et al., 2024). Algerian policymakers recently upheld the use of English in academic fields by announcing English as an official language of teaching and learning content in Algerian universities (Touahmia & Bakar, 2024).

The proliferation of EMI in Algerian universities points toward extensive globalization tendencies and the widening mobility of students and academics. This shift began with training workshops and professional development initiatives for university lecturers (Messeded, 2023; Ouarniki, 2023). Therefore, the working definition of EMI for the context of Algeria is "the teaching of academic content via the medium of English in contexts where other mediums of instruction have been the status quo" (Curle et al., 2024, p. 2).

Currently, EMI is used for the teaching and learning of an array of academic disciplines in Algerian universities, from technological and natural sciences to the humanities and social sciences. This implementation, responding to global trends towards English as a universal language of academia and business, has sparked concerns regarding its effects on students' academic outcomes. Macaro (2018) pointed out that there is a lack of robust empirical evidence supporting the effectiveness of EMI. While some studies suggest potential benefits, including improved listening skills and a slight negative

impact on content learning, these findings are mainly based on teachers' and students' perceptions, which are subject to change over time, rather than on rigorous assessments and test analysis. In this regard, Bradford (2016) underlined numerous obstacles that might impede the adaptation to EMI, including linguistic challenges deriving from students' English language proficiency. For example, a student with restricted English proficiency might experience an increased extraneous cognitive load when attempting to comprehend a lecture delivered in English. This cognitive overload could reduce the cognitive resources available for processing the core academic content of the lecture. According to the Cognitive Load Theory, this could have a detrimental effect on the student's academic performance (Curle et al., 2024).

Academic Performance in EMI

Typically, academic performance denotes the students' ability to engage in learning experiences, participate in activities, and apply knowledge and skills in academic assignments. It can be assessed through various conceptual and methodological frameworks. In the present research, the emphasis is limited to immediate academic performance, which is operationalized using a quantitative measure based on the average of students' grades in final examinations.

Research indicates that limited English proficiency not only constitutes a challenge for EMI students but also hinders their academic performance (Macaro, 2015). In their systematic reviews, Macaro et al. (2018) concluded that the current EMI practices create copious encounters. Insufficient language competence in accordance with a lack of participation in the classroom leads to inadequate understanding of content, which consequently affects students' academic performance. According to Dafouz et al (2014), there is a robust link between students' academic performance and subject-specific language competence. They assume that learning through a foreign language may influence students' knowledge, skills, and overall comprehension of the subject content. However, their study results showed that there are no statistically noteworthy differences between EMI groups and non-EMI groups' final exam grades. Thus, the use of EMI to teach subject content does not appear to have a destructive effect on students' academic performance as demonstrated in coursework and final exam outcomes.

As far as content learning is concerned, several studies recounted that EMI affects students' comprehension of content. Bälter et al. (2024) found a negative impact of EMI on students' academic performance measured in terms of academic knowledge. Nonetheless, the Aizawa et al. (2023) study revealed that while EMI has no negative effect on content learning, it may be detrimentally impacted by English proficiency.

In the Algerian context, Benhamlaoui and Benzadri (2024) reported that the shift from Arabic and French to EMI has the potential to affect students' academic performance. Douar (2024) found that teachers and students faced challenges in adapting to the new medium of instruction at the Oran Graduate School of Economics due to their restricted English proficiency. Students frequently face difficulties in comprehending content delivered in English because their level of proficiency may inhibit them from participating efficiently in the EMI setting.

At this level, concerns about the teachers' ability to use English accurately rise. The English language support provided by the university was not sufficient for teachers to deliver academic content exhaustively, which in turn may have a negative effect on students' academic performance. Although EMI was generally perceived positively among EMI and non-EMI lecturers and students (Touahmia & Bakar, 2024). Senouci and Gacem (2024) found that EMI teachers did not fully engage with the preparatory training sessions due to scheduling disagreements. Messeded (2023) reported that the offered training did not match the lecturers' needs and objectives. Hamane's (2023) study reveals that effective communication in English is one of the primary difficulties faced by teachers, which often impedes the clarity and delivery of subject content. In addition, language barriers pose significant obstacles for students, affecting their ability to fully comprehend lectures and engage in academic discourse. According to Ouarniki (2023), these linguistic challenges, in turn, have a notable impact on student performance, as limited English proficiency can obstruct learning outcomes and academic achievement. In light of that, Dalton-Puffer points out, "because the medium of learning is less perfectly known than the L1, it is feared that this will lead to reduced subject competence as a result of either imperfect understanding or the fact that teachers pre-empt this problem and simplify content" (2011, p.188). Thus, methodology and

empirical research are compulsory for the appropriate EMI implementation (Macaro et al., 2018).

Translanguaging

Originating in Welsh bilingual education contexts, the term "translanguaging," which was recently used to describe interaction and communication in multilingual settings, including bi/multilingual classrooms, was created by Cen Williams in 1980 (Atas, 2023). García (2014) advocates for translanguaging as a pedagogical approach that is both constructivist in nature and transformative in bilingual classrooms. As a pedagogy, it refers to "the ways in which bilingual students and teachers engage in complex and fluid discursive practices that include, at times, the home language practices of students in order to "make sense" of teaching and learning, to communicate and appropriate subject knowledge, and to develop academic language practices" (García, 2014, p. 112).

Translanguaging is a pedagogical practice that is effective for educational contexts in which the language of instruction is different from the language of the learners (Wei, 2018). It refers to "a practice that involves dynamic and functionally integrated use of different languages and language varieties, but more importantly, a process of knowledge construction that goes beyond language(s)" (Wei, 2018, p. 15). Translanguaging as a concept entails the fluid operation of various languages as an integrated communication framework (Curle et al., 2020). The practice appreciates that students speaking multiple languages can flexibly switch between them, and classroom interaction can develop this ability to enrich both language and content learning (Van Viegen, 2020).

The use of L1 and other languages rather than English in an EMI setting has been widely investigated. Sahan and Rose (2021) criticize policies that recommend English-only ideologies and advocate for a critical resistance to monolingual pedagogical practices within EMI classrooms. Their study delineated translanguaging practices as the fluid and flexible use of language in expressing scientific and subject-specific concepts, wherein the teacher predominantly utilized translanguaging as a scaffolding mechanism to support students' understanding. Research conducted in higher education revealed that EMI content lectures and students favored L1 use to support content teaching and learning and make academic content explanations comprehensible (Adamson & Coulson, 2015; Ataş, 2023; Kim

et al., 2017). Kim et al. (2017) found that content lecturers and students switch between languages to overcome the challenge of low-level English proficiency. In a qualitative study scrutinizing lecturers' translanguaging practices in EMI courses in a Turkish higher education institution, Genç et al. (2023) findings demonstrated that lecturers and students used translanguaging for content delivery solely to translate technical terminology, present new content, and discuss content-related concerns. The study signposted that while lecturers also employed translanguaging for social and affective purposes, its use for these functions was relatively limited. In alignment with this view, Mazak and Herbas-Donoso (2015) found translanguaging practices operative for the teaching of scientific concepts in bilingual classes. They conducted an ethnographic case study at a bilingual university in Puerto Rico where Spanish was the chief medium of instruction, but the designed syllabus was written in English as being the language of science and academia. They elucidate a fluidity of language use due to the students' linguistic background and the local sociopolitical context.

Recent research distinguishes 'pedagogical' translanguaging from 'spontaneous' translanguaging. Cenoz (2017) considers pedagogical translanguaging as a planned teaching strategy to incorporate diverse languages for content delivery and classroom discourse. Spontaneous translanguaging, on the other hand, represents the act of approving the use of the students' existing conversational resources without intentional scheduling (Galante, 2020). In the studied setting, translanguaging has been examined mainly as a pedagogical strategy. It was intentionally planned as a scaffolding tool in English-taught courses to help students understand the content and enhance their academic performance. The teacher employed the framework proposed by Sahan and Rose (2021), which identified a number of pedagogical functions, including the transmission of disciplinary content through the translation of field-specific terminology, the presentation of new material, and discussing the new content.

Methodology

The current investigation centers on an experimental design to determine whether the treatment intervention (translanguaging) is the cause of the outcome (academic performance). To afford a more in-depth analysis of translanguaging-desired outcomes in EMI settings, the researcher

conducted an experimental research with a lecturer from the electrical engineering department at Naama University Center during the academic year of 2024-2025. The teacher initially agreed to implement an English-only instructional policy with his first-year students during the first semester. Subsequently, she consented to randomly assign one class to pedagogical translanguaging practices, while another group continued studying through the English-only policy during the following semester. This design intends to facilitate the examination of cause-and-effect relationships between the instructional strategy and students' academic performance.

Participants

The study sample consisted of first-year electrical engineering students in the License degree. By adopting before-after two-group design, this paper focuses on the effects that delivering EMI content through translanguaging (1 group n = 47 students) may exert on students' academic performance (measured through single content-based knowledge and language integrated tests), and compares it to the performance of peers having been taught in the English-only policy (1 group n = 45 students). The respondents have been randomly assigned to the different experimental (X) or control (NO-X) groups, yielding an initial total of 93 students. After excluding those students who did not complete the study tests, the final sample consisted of 86 students: 41 in the X group and 45 in the NO-X group. It should be noted that Algerian students of scientific disciplines are not subjected to any English language proficiency assessment before university enrollment; instead, they are directly placed in EMI classrooms. Indeed, the unidentified English proficiency levels constitute a perplexing situation for both teachers and students.

The selected course for this study, Physics (Electricity and Magnetism), is delivered during the first year, and the two groups in the study have the same 35-year-old female instructor, thus reducing the potential influence of pedagogical variability on content learning. The teacher was in her third academic year of teaching the subject in English. She had also followed a training program on EMI provided by the Center for Intensive Language Learning at Naama University Center. For qualitative data gathering, seven lecturers from the electrical engineering department of Naama University Center consented to participate in the study. The participants, comprising both male and female genders, all held doctoral degrees and self-reported

comparable levels of English language proficiency. Their ages range from 34 to 54.

Instruments

Given the experimental nature of the current study, standardized tests served as the primary research instruments for assessing the academic performance of EMI students in both the control and experimental groups at pre- and post-intervention stages. Before the experimental treatment, the first semester exam was employed as a pretest to see if the two groups were equal. After treatment, both groups sat for the second semester exam, which is designated in the current study as the posttest.

Academic performance was analyzed according to two diverse metrics. The first metric focused on content knowledge acquisition, operationalized as the number of correct answers to summative test items related to the instructional module. The number of questions in each of the study tests was eight, with student performance quantified on a scale from 0 to 20 based on the number of correct responses. This numerical score functioned as the primary indicator of content mastery. All scoring of the tests' questions was automated; the analysis of outcomes was blinded to group distribution. The second metric assessed students' performance in academic English, especially the accurate use of academic terminology and expressions. According to the instructional approaches implemented in each group, two distinct assessment rubrics were applied: the first was applied to the English-only instructional policy. This metric, scaled out of 10 points, is intended to measure the students' ability to express disciplinary content using correct academic language. The assessment rubric contains 5 criteria, each of which is assigned 2 points, including clarity and precision, use of technical terminology, correct grammar and syntax, vocabulary use, and spelling and mechanics. The second rubric was implemented after treatment for the experimental group studied through translanguaging as a scaffolding pedagogical strategy. This rubric esteems translanguaging principles permitting the strategic use of students' full linguistic repertoire, but advocates for academic English proficiency. It includes 5 criteria, each scaled out of 2 points, involving clarity of concepts, correct grammar and syntax, strategic use of L1 for meaning-making, technical terms in either language if accurate, coherence supported by both English and L1 if meaning is clear.

Moreover, a structured interview, which comprises 7 questions, is designed for teachers to provide answers to the third research question. The designed questions intend to deal with the teachers' viewpoints concerning the use of translanguaging practices in developing academic performance in EMI classrooms. The initial two interview questions have been designed to elicit factual background information. The following 4 items are mainly content items aimed at capturing the interviewees' opinions, attitudes, and evaluations. The final question has been carefully planned to permit the interviewed teachers to provide concluding reflections on the EMI situation in Algeria.

Procedure

Data gathering in the current investigation was conducted across three main stages. During the first semester, before the implementation of the experimental intervention, the teacher taught physics content through the English-only instructional approach to both groups. The examination administered at the end of the first semester served as a pretest to establish baseline comparability between the studied groups. Throughout the experiment, taking place during the second semester, the participants received the same content of learning, but through different methods of instruction. Regarding the experimental group, the teacher explicitly integrated translanguaging practices to deliver the designed courses. That is to say, the teacher taught physics lessons through translanguaging to address language proficiency-related difficulties. Adopting the Sahan and Rose (2021) framework, the teacher used pedagogical translanguaging as a scaffolding tool to transmit disciplinary content. The students in the experimental group were encouraged to use their full linguistic repertoire to communicate and internalize subject knowledge. On the contrary, the control group received instruction exclusively through the English language. Upon completion of the instructional intervention, the second-semester examination was administered to both groups and treated as a posttest. The primary objective was to identify whether the experimental group students show evidence of improved academic performance after the treatment they received throughout the second semester. It also aimed at measuring the potential effect of translanguaging practices on learners' academic outcomes.

Results

Content knowledge and language integrated assessment (first semester exam)

To investigate the hypothesized effect of pedagogical translanguaging, in EMI classes, on students' academic performance, the researcher used the first semester exam as a pretest. In addition, the teacher evaluated the content knowledge, and the researcher evaluated the correct use of academic English. The participants' scores are analyzed through the Paired Samples t-test.

Sample characteristics

Before conducting the paired samples t-test, it is essential to delve into the descriptive statistics. Tables one and two present the mean scores and standard deviations for the two groups in the pretest and posttest, respectively.

Table 1. Pretest scores

		Content scores		**language scores**		**total scores**	
Group	N	Mean	SD	Mean	SD	Mean	SD
NO-X group	45	9,18	3,10	4,01	1,64	13,2	4,67
X group	41	9,34	2,97	4,5	1,50	13,84	4,42

The table indicates that students in both groups achieved comparable scores on the first semester examination. Before the treatment, the experimental group reported mean scores of 9.34 in content knowledge and 4.5 in language accuracy, while the control group recorded mean scores of 9.00 and 4.07, respectively. The noted differences between the two groups were minimal, 0.34 in content knowledge and 0.43 in language accuracy. Furthermore, the standard deviations were relatively low across both groups, with the experimental group showing SD=2.97 for content knowledge and SD=1.50 for language accuracy, and the control group

showing SD=3.16 and SD=1.59, respectively. These small standard deviations, in relation to the mean values, indicate the homogeneity of the studied population. Additionally, the total performance scores indicate small differences between the control group, obtaining a mean score of 13.07, and the experimental group, obtaining 13.84. Collectively, the pretest scores reflect academic performance outcomes that were below the mean, because the two groups were not able to reach the average (=15) in the first semester exam.

Table 2. Posttest scores

		Content scores		**language scores**		**total scores**	
Group	N	Mean	SD	Mean	SD	Mean	SD
NO-X group	45	9,11	3,12	4,16	1,53	13,3	4,65
X group	41	12,35	1,68	6,39	0,95	18,75	2,60

The statistical results presented in the table indicate a marked difference in students' performance between the two studied groups. In the posttest, the experimental group achieved improved outcomes, realizing mean scores of 12.35 for the content knowledge, 6.39 in language accuracy, and a total performance of 18.75 for the total performance. Each score represents a notable increase compared to their pretest scores. On the contrary, the control group exhibited relatively stable results, attaining mean scores of 9.11 for the content knowledge, 4.16 for language accuracy, and 13.3 as the overall performance, which are closely similar to the scores recorded in the pretest.

Inferential statistical analysis using the Paired Samples t-test is conducted to measure whether the observed differences between pretest and posttest mean scores are statistically significant.

Normality Assumption

Significantly, attesting to the assumption of the normal distribution is essential before running the Paired Samples t-test. To this objective, the researcher tested the distribution of scores for the two groups using skewness and kurtosis values.

Table 3. Normality tests

Test	Group	Skewness			Kurtosis		
		Content scores	Language scores	Total scores	Content scores	Language scores	Total scores
Pretest	X group	0,2993	-0,1302	0,1654	-0,6929	-0,7732	-0,7490
	No-X group	0,3124	0,04744	0,2203	-0,2717	-0,3321	-0,2453
Posttest	X group	-0,1192	-0,10302	-0,1185	0,2225	0,2023	0,2379
	No-X group	0,1661	0,0730	0,2207	-0,3090	-0,1665	0,0286

The statistical values presented in the table confirm that the assumption of normality is achieved, as the Skewness and Kurtosis levels fall within the acceptable range for conducting a t-test (i.e., between -2 and +2). Accordingly, the results of the Paired Samples t-test can be measured as the scores are normally distributed.

The effect of pedagogical translanguaging on EMI students' academic performance

Table 4. Paired samples t-test on the X group's pretest and posttest

	Pretest Mean (SD)	Posttest Mean (SD)	t(df)	p-value (1-tailed)	Cohen's d
Content score	9,34 (2,97)	12,35 (1,68)	t(40)=5,82	0.001	1,23
Language score	4.5 (1,5)	6,39 (0,95)	t(40)=7,26	0,001	1,51
Total score	13,84 (4,82)	18,75 (2,60)	t(40)=8,46	0,001	1,26

The statistics of the experimental group indicate t-values (content score: 5,82; language score: 7,26; total score: 8,46) that are extremely significant at ($p<0.05$). These results revealed significant improvement in students' performance, i.e., the posttest mean is statistically higher than the pretest

mean. In addition, Cohen's d values show large effect sizes, indicating that translanguaging pedagogy had a strong impact.

Table 5. Paired-samples t-test on the NO-X group's pretest and posttest

	Pretest Mean (SD)	Posttest Mean (SD)	t(df)	p-value (1-tailed)	Cohen's d
Content score	9,18 (3,10)	9,11 (3,12)	t(44)=-0,14	0,22	0,03
Language score	4.01 (1,64)	4,16 (1,53)	t(44)=1,87	0,00	-0,10
Total score	13,2 (4,67)	13,3 (4,65)	t(44)=0,10	0,21	-0,02

As shown in the table, the posttest mean scores are approximately similar to the pretest mean scores. The control group participants' (taught under an English-only policy) scores from the pretest to the posttest point to t-values (-0,14 for content score; 1,87 for language score; 0,10 for total score) that are extremely not significant at ($p<0.05$). The Cohen's d values are less than (0,2), which is the nominal measure for a small effect size, showing insignificant implication. Since they did not receive the instructional treatment, students in the control group did not show increased academic performance.

The findings revealed that teaching through pedagogical translanguaging helped EMI students develop their academic performance in both content knowledge and language accuracy. The students who benefited from the instructional treatment outperformed the students who learned the same content of instruction without any use of translanguaging practices.

Teachers' Interviews

To gain deeper insights into the utility of translanguaging practices to enhance EMI students' academic performance, the researcher conducted structured interviews with 7 teachers from the department of electrical engineering at the University Center of Naama. For confidentiality, each participant is assigned an anonymized identifier (R1, R2, R3, R4, R5, R6, and R7). The two initial interview items are factual, aiming at gaining information about the participants' general teaching experience, as well as

their specific engagement with EMI. The following table sums up the findings.

Table 6. The respondents' teaching experience

	R1	R2	R3	R4	R5	R6	R7
General teaching experience	5 years	16 years	6 years	20 years	7 years	15 years	7 years
EMI teaching experience	3 years	1 year	3 years	0 year	3 years	2 years	3 years

The table reveals diverse general teaching experiences ranging from 5 years to 20 years. The majority of the respondents reported relatively short EMI teaching experiences, which aligns with the recent policy shift announced by the Algerian Ministry of Higher Education and Scientific Research mandating the adoption of EMI in technical and scientific disciplines. This fact indicates that the participants' commitment to EMI is relatively recent and principally policy-determined rather than stemming from established institutional traditions or individually chosen teaching approaches. Moreover, the data in the table signal a discernible pattern wherein teachers with moderately short teaching experiences (R1, R3, R5, and R7) appear to adopt EMI from the onset of its implementation. In contrast, teachers with more extensive teaching experiences (R4 and R2) have revealed a comparatively lower inclination to transition toward EMI.

The third question aimed at inquiring about the encountered issues in EMI classes, and particularly focused on whether students' language proficiency impedes the effective EMI implementation. The results revealed that the majority of participating teachers perceive students' limited English proficiency as a major obstacle hindering the successful delivery of the course content. Notably, R2, R4, and R6 reported that the issue extends beyond students' language proficiency only; they highlighted that teachers' language proficiency also constrains EMI implementation. These participants assumed that their insufficient knowledge of academic English restrained their ability to adopt EMI in their classes.

The fourth question directly explored the use of translanguaging practices to assist students with limited English proficiency. The results unveiled that almost all the participants reported assimilating translanguaging into their teaching to accommodate students' challenges in adapting to the recently

implemented language policy. These teachers generally expressed positive attitudes toward translanguaging, viewing it as a scaffolding approach that assists conceptual understanding and communication. Outstandingly, R4 continued to use French as the medium of instruction, largely resisting the EMI policy.

Concerning the fifth question that asked about the way teachers employ translanguaging practices, several participants, mainly R1, R3, and R7, schedule the employment of pedagogical translanguaging as a scaffolding strategy to facilitate language challenges and enhance content comprehension. Moreover, R5 and R6 express a preference for maintaining the English-only policy; however, they acknowledged the incorporation of spontaneous translanguaging responding to students' communicative needs and learning preferences. These participants further noted that they design their content courses in English; nonetheless, their students frequently rely on their full linguistic repertoire (French, Arabic, and Algerian Darija) due to their difficulties in processing content exclusively in English. Respondent R2, with only one year of experience in EMI, replied that he accepts spontaneous translanguaging practices, which he attributes to his limited proficiency in English. In contrast, R4 continues to use French as the primary medium of instruction, expressing resistance to the adoption of EMI. He justified his standpoint by highlighting the lack of formal training, affirming that he is not sufficiently prepared to implement EMI effectively.

In response to the sixth interview question, which addressed the impact of translanguaging practices on students' academic performance, the participants demonstrated a broad agreement. The six teachers, who reported using translanguaging practices, whether implemented intentionally as a pedagogical strategy or employed spontaneously, deliberated its positive contribution to students' academic outcomes. They attributed students' improved performance in final examinations to the supportive role of translanguaging in facilitating comprehension and engagement with course content.

The final interview question invited the respondents to articulate their overarching perspectives regarding the adoption of EMI within Algerian higher education. Overall, the answers revealed positive attitudes toward the potential of EMI to internationalize higher education. Though

recognizing its advantages, the participants simultaneously expressed concerns over a range of challenges obstructing effective implementation. The major concern was the insufficient English language proficiency of both students and instructors. They advocated for the introduction of a preparatory year designed to equip students with the requisite linguistic competencies prior to their engagement with discipline-specific content. Furthermore, they emphasized the need for inclusive and continuous professional development programs to enhance EMI teachers' skills to accommodate the diverse linguistic needs of their students and deliver content knowledge effectively.

To sum up, the interview results indicated that the respondents have a relatively short experience of teaching through EMI. They consider its implementation as indispensable to achieve internationalization in higher education, spotting its importance for scientific research publishing and international scholarships. Apart from the pedagogical and scientific implications, teachers raised apprehensions concerning its linguistic facet. They contended that translanguaging is a dynamic instructional approach that can result in supportive academic performance to deal with the students' linguistic challenges.

Discussion

This research explored the impact of pedagogical translanguaging on students' academic performance in a content module taught in the department of electrical engineering. Employing an experimental research design, the study compared two cohorts: a control group receiving instruction exclusively in English and an experimental group taking the same content courses through translanguaging pedagogy. Academic performance was measured along two dimensions: mastery of disciplinary content and proficiency in academic language use. Based on the findings, pedagogical translanguaging practices have a positive impact on students' academic performance. The experimental group students performed better when tested on their academic knowledge after studying through translanguaging practices, and they developed their linguistic skills to a higher degree compared to the students in the EMI-only policy (control group). The statistical analysis of the test scores displayed significant differences between the students' scores before and after the pedagogical intervention. Given the random assignment of the participants to the two

groups, the final considerable differences in outcomes can be reasonably credited to the treatment the experimental group received. The strong effect size and statistical power of the findings further underline the significant effect of translanguaging on learners' academic achievements.

The first research question of the current study aimed to examine the effect of translanguaging practices on students' academic performance. The findings demonstrated a distinguished improvement among students in the experimental group, who achieved (18,75) as the posttest mean score in total performance. The latter is extremely higher than the mean recorded in the pretest (13,84). In contrast, the control group posttest mean score (13,3) did not reveal significant development in comparison with the posttest mean (13,2), indicating limited progression under the English-only instructional approach. In this vein, Bälter et al. (2023) point out that the medium of instruction can considerably affect academic performance in EMI contexts. Their study findings revealed that students taught through the English-only policy exhibited low performance and higher dropout rates. Thus, they called for careful consideration of EMI implementation, in addition to applicable pedagogical and linguistic support to boost students' outcomes. In view of that, Genk et al.'s (2023) study supported the efficiency of translanguaging practices in assisting EMI students with language-related challenges. Translanguaging practices have been noticed across diverse EMI contexts globally (Sahan & Rose, 2021), and it is increasingly acknowledged as a pedagogical strategy that aims at mitigating students' challenges in their English-taught courses (Aizawa et al., 2020; Curle et al., 2020; Wei, 2018).

The results also demonstrated that pedagogical translanguaging has a prospective effect on the experimental group's academic performance. The experimental group statistics indicated a t-test value (8,46) on the total performance, which is extremely significant at (0,05). On the contrary, the statistics of the control group participants from the pretest to the posttest show a t-value (0,10) on total performance, which is not significant at (0,05). These results may answer the second question, "To what extent do EMI students show improved academic performance after experiencing pedagogical translanguaging?" One interpretation of the results lies in the use of the translanguaging instructional strategy. This interpretation aligns with what Mazak and Herbas-Donoso (2015) suggest. Their research findings revealed that translanguaging could serve as an effective

pedagogical practice to instruct scientific concepts in bilingual classroom settings. Similarly, Garcia (2014) and Atas (2025) found that translanguaging practices afford pedagogical implications for teachers operating within EMI environments. In a comparable but different educational context, Van Viegan's (2020) observations of classroom instruction in a Canadian school serving multilingual students demonstrated that translanguaging practices were useful to complete tasks, express mathematical thinking, and achieve learning objectives necessary for assessment. Although these studies contributed valuable insights into the ways translanguaging practices are used in EMI classrooms, they have not offered definitive evidence regarding the pedagogical effectiveness of translanguaging or the extent to which the use of students' full linguistic repertoire might improve their academic outcomes.

As far as the last research question is concerned, "Do EMI teachers favor the use of translanguaging to enhance academic performance?" the teachers' interviews indicated positive attitudes toward the instructional approach. Content lecturers using EMI viewed translanguaging as a useful resource to facilitate content delivery. These findings line up with previous research (Adamson & Coulson, 2015; Kim et al, 2017) that underscores the significant role of translanguaging practices to overcome EMI students' language-related challenges. Moreover, the interview results exposed that lecturers' English proficiency also prompted the use of translanguaging practices. In line with this, Kim et al. (2017) found that translanguaging practices might result from the lecturers' language proficiency. The participant teachers accredited EMI implementation, but considered language proficiency as a noteworthy predictor of success. This finding seems to confirm Macaro's (2018) and Curle et al.'s (2020) claims regarding the necessity of addressing both students' and lecturers' linguistic needs in EMI settings.

Conclusion

This study aimed to investigate the degree to which translanguaging pedagogy could enhance EMI students' academic performance. It attempted to offer a suggestion to develop students' academic performance within EMI Higher Education in Algeria. The researcher took the electrical engineering department at Naama University Center as a case to apply the instructional treatment. The findings of this study unveiled that the

students who did not have the chance to learn through pedagogical translanguaging (e.g., learners in the X groups) performed less than the ones who benefited from the instructional treatment. Consequently, pedagogical translanguaging as a model of instruction scaffolds students to attain content knowledge in EMI classrooms. It prompts the students to use their linguistic repertoire fluidly for the accomplishment of the course content. In addition, pedagogical translanguaging inspires the students to develop their performance in the English language. It assists them in producing clear concepts supported by the strategic use of L1 for meaning making. The advantageous results achieved from translanguaging instruction fortified the researcher to assume that such an approach may serve as a productive foundation for the EMI implementation in the Algerian higher education context.

An additional assumption that the current study recommends is directing EMI teachers' awareness to translanguaging as an assistive tool; training teachers to apply translanguaging strategically to overcome language-related challenges; offering content teachers support programs to improve their skills in integrating content and language. However, the present study did not assess the English language proficiency of participating teachers. While this variable did not fall within the study's objectives, it may present a potential limitation in examining translanguaging practices within an EMI context. For example, the interview results revealed that, despite differing perspectives on the type of translanguaging to be used, some respondents reported constraints related to their English proficiency. These findings advocate a requirement to develop EMI teachers' linguistic competence to certify the effective implementation of pedagogical strategies. Thus, this arena entails more research. Besides, it is crucial to examine whether learners would be able to develop English language proficiency within EMI programs.

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