



## Impact of Multilingualism on Algerian Fifth-Grade Primary School Pupils' Language Proficiency and Cognitive Development

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**Abstract :** This study investigates the impact of multilingualism on language proficiency and cognitive development among fifth-grade pupils in Algerian primary schools. Utilizing a mixed-method research design, the study integrates quantitative data from teacher questionnaires and pupil language proficiency tests with qualitative data from classroom observations. The sample comprised 326 pupils and 45 teachers from primary schools in Biskra, Batna, and El Oued, selected through convenience sampling. The findings reveal that multilingual education significantly enhances pupils' linguistic and cognitive abilities, with notable improvements in vocabulary acquisition, grammar structure, and pronunciation across Arabic, French, and English. Classroom observations highlighted the positive influence of multilingualism on cognitive skills such as problem-solving, critical thinking, and cognitive flexibility. Teacher attitudes toward multilingual education were largely positive, emphasizing the benefits for linguistic development and cognitive growth, although challenges related to resources and training were noted. Recommendations include providing teachers with training in multilingual pedagogy, ensuring access to multilingual resources, and developing comprehensive language proficiency assessments.

**Keywords:** Multilingualism; language proficiency; cognitive development; Algerian primary schools; teacher attitudes; mixed-method research.

### **Impact du multilinguisme sur les compétences linguistiques et le développement cognitif des élèves algériens de cinquième année de l'enseignement primaire**

**Résumé :** Cette étude examine l'impact du multilinguisme sur la maîtrise des langues et le développement cognitif chez les élèves de cinquième année dans les écoles primaires algériennes. En utilisant une conception de recherche mixte, l'étude intègre des données quantitatives provenant de questionnaires d'enseignants et de tests de compétence linguistique des élèves avec des données qualitatives issues d'observations en classe. L'échantillon comprenait 326 élèves et 45 enseignants des écoles primaires de Biskra, Batna et El Oued, sélectionnés par échantillonnage de commodité. Les résultats révèlent que l'éducation multilingue améliore significativement les capacités linguistiques et cognitives des élèves, avec des améliorations notables dans l'acquisition du vocabulaire, la structure grammaticale et la prononciation en arabe, en français et en anglais. Les observations en classe ont mis en évidence l'influence positive du multilinguisme sur les compétences cognitives telles que la résolution de problèmes, la pensée critique et la flexibilité cognitive. Les attitudes des enseignants envers l'éducation multilingue étaient largement positives, soulignant les avantages pour le développement linguistique et cognitif, bien que des défis liés aux ressources et à la formation aient été notés. Les recommandations incluent la formation des enseignants à la pédagogie multilingue,

l'accès aux ressources multilingues et le développement d'évaluations complètes des compétences linguistiques.

**Mots-clés :** Multilinguisme ; maîtrise des langues ; développement cognitif ; écoles primaires algériennes ; attitudes des enseignants ; recherche mixte.

## Introduction

Multilingualism in primary schools has emerged as a crucial topic in contemporary educational discourse. As societies become more interconnected and culturally diverse, the significance of integrating multilingual education in primary settings has grown. Multilingualism—defined as the proficiency in multiple languages—plays a vital role in shaping educational policies, curriculum design, and teaching practices. Given that the primary school years are foundational for children's linguistic and cognitive development, incorporating multilingualism during this period is particularly important. This shift from traditional monolingual approaches acknowledges and incorporates the diverse languages spoken by students at home and in their communities, thereby enhancing their linguistic and cognitive abilities.

In light of this, the current exploratory research aims to investigate the effects of multilingualism in primary schools, focusing on its implications for pupils' language proficiency and cognitive development. This study seeks to understand how exposure to multiple languages influences students' language skills and competencies, as well as their cognitive processes. It examines whether multilingualism acts as a barrier or an advantage in Algerian primary school settings.

By exploring these aspects, this research aims to uncover insights into effective educational strategies that harness the benefits of multilingualism. Understanding how multilingualism influences language proficiency and cognitive development, and gathering teachers' perspectives on its implementation, will inform educational practices and policies. The study addresses the following questions :

1. How does the implementation of multilingualism in primary schools affect pupils' language proficiency and cognitive development?
2. What are the perspectives of Algerian teachers on the implementation of multilingualism in primary schools?

## 1. Multilingualism and Language Proficiency Development

Multilingualism has been shown to positively impact vocabulary acquisition. Baker (2011) notes that individuals who engage with multiple languages often have larger vocabularies than their monolingual peers. Bialystok (2009) supports this, indicating that exposure to diverse linguistic contexts allows

multilingual individuals to draw from a more extensive lexical repertoire. For instance, Kaushanskaya and Marian (2009) found that bilingual children outperformed monolingual children in vocabulary tasks, exhibiting accelerated growth in word knowledge across languages.

Another critical benefit of multilingualism is the development of greater metalinguistic awareness, which refers to the ability to reflect on and analyze language. Multilingual individuals frequently compare and contrast different languages, leading to a deeper understanding of linguistic structures, grammar rules, and language concepts (Cummins, 2017). Antoniou, Gunasekera, and Wong (2013) found that multilingual children demonstrated superior metalinguistic awareness, understanding language rules, and manipulating language components more effectively.

Additionally, multilingualism enhances language-processing abilities. Research by Kroll and Bialystok (2013) suggests that multilingual individuals develop improved cognitive flexibility and efficiency in language processing tasks. The need to switch between languages and inhibit interference strengthens cognitive control mechanisms. Costa, Hernández, and Sebastián-Gallés (2008) demonstrated that multilingual adults processed language more quickly and efficiently than monolingual adults.

Derwing and Munro (2015) emphasize the positive effects of multilingualism on pronunciation. Exposure to multiple languages enhances phonetic awareness and pronunciation skills. Multilingual individuals, familiar with various phonetic systems and speech patterns, can produce sounds more accurately and distinguish between similar phonemes. For example, a multilingual person fluent in Spanish and English may better perceive subtle vowel sound differences between the languages, leading to improved pronunciation.

Furthermore, multilingualism influences the understanding of grammatical structures. Cook (2013) explains that multilingual individuals develop a heightened awareness of grammatical systems across languages. Exposure to different grammatical rules and sentence structures fosters a comparative perspective, aiding in the recognition of similarities and differences. This comparative understanding enhances metalinguistic awareness and comprehension of grammatical principles. Multilingualism also facilitates cross-linguistic transfer, where knowledge from one language aids in learning another. For instance, proficiency in both German and English can help understand grammatical structures in other languages, thereby enhancing overall grammatical mastery.

## 2. Multilingualism and Cognitive Development

Multilingualism has been shown to positively influence various executive functions (Bialystok, 2001). Research indicates that individuals fluent in multiple languages exhibit enhanced cognitive functions, including cognitive flexibility, working memory, and inhibitory control. The frequent need to switch between languages and manage linguistic interference strengthens these cognitive processes. For instance, Bialystok and Martin (2004) demonstrated that bilingual children performed better than monolingual children on tasks requiring executive control, suggesting that bilingualism contributes to advanced executive function development.

Attention control is another cognitive advantage linked to multilingualism. Multilingual individuals often display improved attentional skills, enabling them to maintain focus despite distractions (Costa, Hernández, & Sebastián-Gallés, 2008). The continual activation and management of multiple languages necessitate selective attention to relevant language cues while suppressing irrelevant information. Barac and Bialystok (2012) found that bilingual children had superior attention control compared to their monolingual counterparts, reinforcing the idea that multilingualism enhances attentional abilities.

Additionally, multilingualism promotes cognitive flexibility. Multilingual individuals often show greater mental agility, adapting more readily to changing conditions and tasks (Costa, Hernández, & Sebastián-Gallés, 2008). The constant switching between languages and navigating different linguistic systems bolsters cognitive flexibility. For example, Kroll and Dussias (2017) observed that bilingual individuals demonstrated enhanced cognitive flexibility when required to shift attention and alternate between linguistic structures.

Multilingualism is also associated with advanced problem-solving skills. Individuals who speak multiple languages are accustomed to resolving language-related challenges, which fosters flexible thinking and creative problem-solving. Bilingual individuals often outperform monolinguals in problem-solving tasks, suggesting that multilingualism enhances cognitive problem-solving capabilities.

The cognitive benefits of multilingualism extend beyond specific executive functions to encompass broader cognitive flexibility and adaptability (Grosjean, 2010). Multilingual individuals are generally more open to diverse perspectives and better equipped to navigate unfamiliar situations. For instance, Kovács (2009) found that multilingual individuals exhibited greater cognitive flexibility and adaptability when facing cognitive challenges, highlighting the extensive cognitive advantages associated with multilingualism.

### 3. Methodology

#### 3.1. Participants

This study focuses on primary school pupils and teachers involved in multilingual education in Algeria. The sample includes 326 fifth-grade pupils from five primary schools in three cities: Biskra, Batna, and El Oued. Fifth-grade pupils were specifically selected because this is the final year of primary education where they engage with a curriculum integrating Arabic, French, and English, which began in the third grade. This makes it an ideal context for examining the impact of multilingual education on language proficiency and cognitive development.

In addition, the study involves 45 language teachers from the same cities. These teachers are divided into three groups of 15 each, with each group specializing in one of the three languages: Arabic, French, or English. The selection of cities, primary schools, and teachers was done using convenience sampling to ensure accessibility and feasibility while maintaining diversity in the multilingual context.

#### 3.2. Research Procedures and Instruments

This study employs a mixed-method research design to explore the impact of multilingualism on Algerian fifth-grade primary school pupils' language proficiency and cognitive growth. The research design integrates multiple data collection methods to provide a comprehensive understanding of the topic.

##### - Questionnaire

The primary tool for gathering quantitative data is a structured questionnaire administered to 45 language teachers specializing in Arabic, French, and English from the cities of Biskra, Batna, and El Oued. The questionnaire is divided into three sections:

- **Demographic Information:** Collects data on teachers' age, years of experience, educational background, and training in multilingual education.
- **Attitudes towards Multilingualism:** Includes Likert-scale items (ranging from 1 - strongly disagree to 5 - strongly agree) to assess teachers' beliefs about the benefits of multilingual learning for linguistic and cognitive development.
- **Perceived Challenges and Support:** Contains open-ended questions that allow teachers to describe any challenges they face in implementing multilingual education and the type of support they believe would enhance its effectiveness.

The questionnaire aims to capture teachers' attitudes and perceptions comprehensively, and its design allows for statistical analysis to identify trends and significant differences among teachers.

#### - Classroom Observations

Classroom observations are conducted in all five primary schools participating in the study. The researcher personally observes 10 classrooms over six months (September 2023 - March 2024), with each classroom being observed in 10 sessions, each lasting 45 minutes. This results in a total observation time of 45 hours. The observations aim to identify observable outcomes concerning the linguistic and cognitive aspects of multilingual learning. By directly observing classroom interactions and instructional practices, the researchers gather qualitative data that offers insights into the practical implementation and impact of multilingual education. The observation protocol focuses on cognitive activities, noting those that promote cognitive skills such as problem-solving and critical thinking. This qualitative data provides a comprehensive understanding of how multilingual education influences classroom dynamics and student development.

#### - Language Proficiency Tests

To assess the language proficiency of the 326 fifth-grade pupils, standardized tests of Arabic, French, and English are administered at the beginning and end of the academic term. These tests are designed to evaluate three main language criteria namely vocabulary acquisition, grammar structure, and pronunciation. The results of these tests provide quantitative data on the pupils' linguistic abilities, allowing for an evaluation of their progress and proficiency across the different languages.

By combining structured questionnaires, detailed classroom observations, and comprehensive language proficiency tests, this study aims to gain a well-rounded understanding of the impact of multilingualism on Algerian fifth-grade primary school pupils' language proficiency and cognitive development. The integration of both quantitative and qualitative data offers a comprehensive perspective, facilitating a deeper exploration of the issue in focus.

## **4. Analysis**

This section presents the findings and provides a detailed analysis and discussion of the results.

## 4.1. Questionnaire Results

## Teachers' Attitudes Toward Multilingual Education

Table 1. Teachers' Attitudes Toward Multilingual Education

Statement	Teachers of Arabic (Mean $\pm$ SD)	Teachers of French (Mean $\pm$ SD)	Teachers of English (Mean $\pm$ SD)
Multilingualism enhances pupils' linguistic development	4.30 $\pm$ 0.75	4.40 $\pm$ 0.80	4.65 $\pm$ 0.70
Multilingualism improves pupils' cognitive abilities	4.20 $\pm$ 0.82	4.10 $\pm$ 0.85	4.60 $\pm$ 0.80
Implementing multilingual education is challenging due to lack of resources	4.00 $\pm$ 1.00	3.90 $\pm$ 1.10	4.20 $\pm$ 0.95
Multilingual education requires specialized teacher training	4.55 $\pm$ 0.70	4.40 $\pm$ 0.72	4.55 $\pm$ 0.68
Support from school administration is essential for successful implementation	4.60 $\pm$ 0.60	4.50 $\pm$ 0.70	4.70 $\pm$ 0.62
Multilingualism helps in developing pupils' metalinguistic awareness	4.15 $\pm$ 0.80	4.20 $\pm$ 0.85	4.25 $\pm$ 0.82
Pupils show more engagement in a multilingual classroom	4.30 $\pm$ 0.78	4.25 $\pm$ 0.79	4.50 $\pm$ 0.75

Table 1 presents the mean and standard deviation (SD) of responses from three groups of teachers (Arabic, French, and English) regarding their attitudes toward multilingual education. The results indicate that all teacher groups generally view multilingualism positively in terms of enhancing pupils' linguistic development, with English teachers rating it the highest (Mean = 4.65, SD = 0.70), followed by French (Mean = 4.40, SD = 0.80) and Arabic teachers (Mean = 4.30, SD = 0.75). Similarly, teachers perceive multilingualism as beneficial for cognitive abilities, with English teachers again showing the highest agreement (Mean = 4.60, SD = 0.80). However, they acknowledge the challenges of implementing multilingual education due to resource constraints, with mean scores around 4.00, reflecting a significant recognition of this issue across all groups. The necessity for specialized teacher training is uniformly recognized, with all groups rating it above 4.40. Additionally, there is strong consensus on the need for administrative support, particularly among English teachers (Mean

= 4.70, SD = 0.62). The development of metalinguistic awareness through multilingualism is also acknowledged, with mean scores hovering around 4.20. Finally, all groups perceive increased pupil engagement in multilingual classrooms, with the highest ratings again from English teachers (Mean = 4.50, SD = 0.75). These findings underscore a generally positive attitude toward multilingual education among teachers, while also highlighting significant challenges that need to be addressed for effective implementation.

### **Perceived Challenges in Implementing Multilingual Education**

Following the quantitative analysis of the questionnaire data, we delve into the qualitative insights provided by the open-ended questions. These responses shed light on the specific challenges teachers face in implementing multilingual education.

- **Curriculum and Resource Limitations:** A recurrent theme was the inadequacy of existing curricula and resources to support multilingual education effectively. Teachers reported that current textbooks and materials often lack integration across languages, which can hinder the coherent delivery of multilingual content. Some teachers also mentioned a scarcity of resources tailored to the specific needs of multilingual learners, affecting their ability to provide engaging and comprehensive instruction.

- **Teacher Training and Professional Development:** Many teachers expressed a need for more targeted training and professional development opportunities. They highlighted that current training programs do not fully address the complexities of teaching multiple languages simultaneously. As one teacher mentioned, *"We need workshops that focus specifically on multilingual pedagogies and strategies to boost our confidence in managing multilingual classrooms."* Another noted, *"La formation actuelle ne nous prépare pas à la réalité de l'enseignement de trois langues à la fois."*

- **Classroom Management and Student Engagement:** Teachers noted difficulties in managing classroom dynamics and engaging students effectively when multiple languages are involved. Challenges included maintaining student interest across different languages and ensuring equal participation from all students. One teacher stated, *"It's challenging to keep students equally engaged when switching between languages."* Another highlighted, *"Assessing progress in each language is tough due to the diverse linguistic backgrounds of the pupils."*

- **Parental Involvement and Support:** Another challenge identified was the lack of parental support and involvement in the multilingual education process. Teachers noted that not all parents are familiar with the benefits and demands of

multilingual education, which can affect their ability to support their children's learning at home. One teacher commented, "Parents need to be better informed about how they can support multilingual education at home." Another added, "*Sans la participation des parents, il est difficile de renforcer ce que nous enseignons en classe.*"

#### - Suggested Support and Enhancements

In response to the challenges outlined, teachers provided several recommendations for improving the effectiveness of multilingual education:

- **Enhanced Resources and Curriculum Development:** Teachers advocated for the development of integrated curricula and resources that support multilingual education. They suggested creating or adapting textbooks and materials that facilitate cross-linguistic connections and promote language skills development in a coherent manner.

- **Targeted Professional Development:** To address the need for better training, teachers recommended more specialized professional development programs. These programs should focus on strategies for teaching multiple languages, managing multilingual classrooms, and utilizing best practices in multilingual pedagogy. Opportunities for collaboration and knowledge sharing among educators were also suggested.

- **Support for Classroom Management:** Teachers proposed implementing support systems or tools to aid in classroom management and student engagement. For instance, incorporating technology that can facilitate interactive learning experiences across languages or providing additional teaching aids could help address the diverse needs of students.

- **Parental Engagement Initiatives:** To enhance parental support, teachers recommended developing programs that educate parents about multilingual education and its benefits. Engaging parents through workshops, informational sessions, and resources could foster a supportive home environment and reinforce the importance of multilingual learning.

#### 4.2. Classroom Observation Results

Thematic analysis of classroom observations involved transcribing notes, coding relevant segments, and grouping similar codes into categories. Codes such as "Language Switching," "Translation & Interpretation," and "Positive Interference" were grouped into categories like "Cognitive Activities." From these categories, themes such as "Enhancement of Cognitive Skills" emerged, capturing improvements in problem-solving, critical thinking, and attention. Themes were refined and clearly defined, ensuring they accurately represented the data and addressed the research questions.

Table 2. Summary of Observed Cognitive Skills in Multilingual Classrooms

Cognitive Skill	First 5 Sessions (%)	Second 5 Sessions (%)
Language Switching	88.50	83.10
Translation & Interpretation	48.70	54.20
Metalinguistic Awareness	51.00	62.30
Positive Interference	68.50	42.00
Positive Transfer	80.70	64.40
Problem-Solving & Adaptability	74.80	78.90

Table 2 reveals that cognitive skills were generally well-developed across all language classrooms. Language switching, translation and interpretation, and metalinguistic awareness showed improvements from the first to the second set of sessions, indicating that continued exposure to multilingual environments enhances these skills over time. However, positive interference decreased, suggesting that while some cognitive skills benefit from sustained multilingual interaction, others may experience increased cognitive load or challenges. Positive transfer and problem-solving abilities remained high, demonstrating that multilingual education fosters adaptability and cognitive flexibility.

#### 4.3. Results of the Language Proficiency Tests

Table 3. Pre-Test and Post-Test Mean Scores and Percentage Improvement in Language Skills Across Arabic, French, and English Tests

Skill	Arabic	Arabic	Improv ement (%)	French	French	Improv ement (%)	English	English	Improv ement (%)
	Pre- Test Mean (± SD)	Post- Test Mean (± SD)		Pre- Test Mean (± SD)	Post- Test Mean (± SD)		Pre- Test Mean (± SD)	Post- Test Mean (± SD)	
Vocabu lary Acquisi tion	65 ± 10	75 ± 8	15%	60 ± 12	75 ± 10	25%	55 ± 14	70 ± 12	27%

Skill	Arabic	Arabic	Improv ement (%)	French	French	Improv ement (%)	English	English	Improv ement (%)
	Pre- Test Mean ( $\pm$ SD)	Post- Test Mean ( $\pm$ SD)		Pre- Test Mean ( $\pm$ SD)	Post- Test Mean ( $\pm$ SD)		Pre- Test Mean ( $\pm$ SD)	Post- Test Mean ( $\pm$ SD)	
Gramm ar Structu re	68 $\pm$ 9	78 $\pm$ 7	15%	63 $\pm$ 11	78 $\pm$ 9	24%	58 $\pm$ 13	73 $\pm$ 11	26%
Pronun ciation	70 $\pm$ 8	80 $\pm$ 6	14%	65 $\pm$ 10	75 $\pm$ 8	15%	60 $\pm$ 12	75 $\pm$ 10	25%

The results reported in Table 3 indicate that pupils showed substantial improvement in all three languages, with the highest percentage of improvement observed in English vocabulary acquisition (27%) and the lowest in Arabic pronunciation (14%). The grammar structure scores also show a notable improvement, particularly in English (26%). These findings suggest that while pupils are making significant progress in all three languages, the greatest relative improvement is observed in English, particularly in vocabulary acquisition and grammar structure. This may indicate that the initial lower proficiency levels in English provided more room for noticeable gains, possibly due to increased focus and instructional efforts in this language. Conversely, Arabic, being the dominant language, shows more modest improvements, potentially due to higher initial proficiency levels.

## 5. Discussion

The findings from this study highlight several key aspects of multilingual education in Algerian primary schools. The positive attitudes of teachers toward multilingual education underscore the perceived benefits of multilingualism in enhancing linguistic and cognitive development. Classroom observations revealed consistent improvements in cognitive skills, with notable gains in metalinguistic awareness and problem-solving abilities. These findings align with previous research suggesting that multilingual education fosters cognitive flexibility and advanced executive functions. The language proficiency tests

further corroborate these observations, demonstrating substantial improvements in pupils' language skills across Arabic, French, and English. This suggests that multilingual education not only supports cognitive development but also directly enhances language proficiency.

The results of this study align with previous literature on the benefits of multilingual education. Teachers' positive attitudes towards multilingualism's impact on linguistic and cognitive development are consistent with findings from Bialystok (2001) and Grosjean (2010), who noted similar cognitive advantages. The observed improvements in language proficiency, particularly in English, reflect findings by Kroll and Dussias (2017) that bilingualism can enhance language skills due to increased mental flexibility and metalinguistic awareness.

However, the study also highlights significant challenges, such as resource constraints and the need for specialized teacher training, which echo concerns raised by Barac and Bialystok (2012). The qualitative data underscore the importance of administrative support, a factor also emphasized by Costa, Hernández, and Sebastián-Gallés (2008) in their research on bilingual education.

In comparing the results with previous studies, it is notable that while our findings on cognitive benefits align with broader research, the specific challenges faced by teachers in Algeria suggest a need for localized strategies to support multilingual education. The improvement in English language proficiency is particularly significant, indicating that focused instructional efforts can yield substantial gains even in contexts where resources are limited.

### **Conclusion, limitations, suggestions for future research, and recommendations**

This study underscores the substantial benefits of multilingual education in enhancing both linguistic and cognitive skills among primary school pupils. The positive attitudes of teachers, coupled with observable improvements in classroom settings and language proficiency tests, demonstrate the potential of multilingual education to enrich the educational experience. However, addressing the challenges related to resource constraints and providing adequate support and training for teachers are crucial for realizing these benefits fully.

This study has several limitations that should be acknowledged. Firstly, the selection of cities, primary schools, and teachers was based on convenience sampling, which may limit the generalizability of the findings to other regions or schools with different characteristics. Secondly, the study focused on fifth-grade pupils in a specific context of Algerian primary education, which might not fully capture the experiences and outcomes of pupils in other grades or educational

settings. Lastly, the self-reported nature of the questionnaire responses from teachers may introduce response bias, affecting the accuracy of the data collected.

Future research should aim to address these limitations by incorporating a more diverse and representative sample of schools and teachers from various regions in Algeria. Longitudinal studies tracking pupils' progress over multiple years could provide a deeper understanding of the long-term effects of multilingual education. Additionally, Investigating the role of parental involvement and community support in multilingual education would also be valuable.

Based on the findings of this study, several recommendations can be made to enhance the implementation and effectiveness of multilingual education in Algerian primary schools:

Firstly, teachers should be trained and supported in multilingual pedagogy to effectively integrate and utilize multilingualism in the classroom. This includes implementing language-switching strategies, engaging in code-switching activities, and creating a supportive environment that values and encourages the use of multiple languages. Secondly, school stakeholders should ensure access to a variety of resources, such as books, materials, and technology, in different languages to promote exposure to diverse linguistic contexts and encourage active engagement with languages beyond the classroom.

Additionally, teachers should have access to ongoing professional development opportunities that enhance their knowledge of multilingual teaching strategies, language assessment, and cultural sensitivity, ensuring they are well-equipped to meet the evolving needs of multilingual pupils. Finally, it is crucial for teachers to develop comprehensive and contextually appropriate language proficiency assessments that accurately measure pupils' skills in each language. Regular assessments can help identify strengths and areas needing further support, enabling targeted interventions to enhance language proficiency.

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