People's Democratic Republic of Algeria

Ministry of Higher Education and Scientific Research

Abbes Laghrour University-Khenchela

Faculty of Letters and Languages

Department of English Language and Literature

The Role of Interdisciplinarity in CLIL Didactic Materials The Case of Master One student in the Biology department at Abbes Laghrour University-Khenchela.

Thesis Submitted to the Department of English in Partial Fulfillment of the Requirements for Master's Degree of Master in Foreign Language and Culture

Submitted by	**Doua Sabeg / Nada Eraihane Rakai**
Supervised by	**Dr. Ounis Salim**
Examiner	**Dr.Belhadj**
President	**Dr.Boumaaraf**

AcademicYear:2023-2024

Dedication

Praise be to Allah and gratitude to Allah, who has made it easy for us to reach this day. I dedicate this success to those who taught me that success comes only through patience and perseverance. To the one who illuminated my path to my beloved family ; For your unwavering love, support, and encouragement throughout this journey, I dedicate this research to you. To my grand parents and my parents , whose sacrifices and guidance have shaped me into the person I am today, I am forever grateful . To my brothers and sisters, your camaraderie and belief in me have been a constant source of strength. To my dear friends, your understanding and encouragement have brightened even the toughest days you full it with enjoyment and wonderful moments .

To my supervisor and teachers, Your expertise, guidance, and mentorship have been invaluable in shaping this research. Your patience, insights, and unwavering support have inspired me to push the boundaries of knowledge and strive for excellence. This work is a reflection of your dedication to fostering intellectual growth and academic rigor. Thank you for believing in me and guiding me every step of the way.

Acknowledgments

Firstly, we extend our gratitude to Allah for granting us the strength and determination to undertake this research endeavor.

Our heartfelt appreciation goes to our supervisor, Mr. Ounis Salim, for his unwavering support, patience, and invaluable guidance throughout this journey.

We are grateful to the board of examiners for their willingness to review our work and provide valuable feedback.

Special thanks are also extended to the esteemed teachers, particularly Dr. Sadrati Abd NOUR, Mrs. Soumia Boutarfa, Mrs. Oumayma Naili, Mrs. Fouzia Derouich, Dr . Faycal Mamen and Mrs. Djamila Lachkheb, for their assistance during the interview process.

Lastly, we would like to express our deepest appreciation to the Master One students in the Biology department who participated in this study by completing the questionnaire. Your contribution was instrumental to the success of this research.

Abstract

This study dives into the fascinating world of blending different subjects together in teaching materials known as Content and Language Integrated Learning (CLIL). Specifically, it focuses on how this integration impacts educational practices in Algerian universities, like Khenchela University. By combining theories and real-life studies, this research explores the challenges and opportunities of incorporating different disciplines into CLIL teaching methods. Using a mix of different research methods, the study carefully examines how different subjects can enhance both content knowledge and language skills. The findings highlight the positive collaboration among teachers, showing how different disciplines can work together harmoniously in the education system. Additionally, the research reveals that students are open to interdisciplinary collaboration, demonstrating their ability to reflect critically and communicate effectively, which are key skills in navigating the complexities of modern academia. However, the study also sheds light on ongoing challenges, such as the lack of evaluation systems and specialized training in CLIL teaching methods. These findings emphasize the need to create an environment that promotes interdisciplinary collaboration, critical thinking, and effective communication. By addressing these challenges head-on and making the most of interdisciplinary approaches, educators can unlock the full potential of CLIL, equipping students with the skills they need to succeed in a constantly changing global landscape.

Key words: interdisciplinarity, CLIL, didactic materials, collaboration, critical reflection, communication, systematic evaluation, Algerian universities.

List of Tables

List of Acronyms

1. CLIL: Content and Language Integrated Learning

2. ICT: Information and Communication Technology

Table of contents

General Introduction

Outline

Introduction :

Embarking on a study of the role of interdisciplinarity in the design of CLIL (Content and Language Integrated Learning) didactic materials offers a fascinating exploration into the intersection of diverse fields within education. This inquiry delves into how the integration of various disciplines can enhance the efficacy and depth of CLIL materials, which aim to teach subjects such as science, history, or art in a foreign language while concurrently fostering both content understanding and language proficiency. Understanding the significance of interdisciplinarity in this context involves unpacking how it facilitates the creation of engaging learning experiences that transcend traditional disciplinary boundaries, promoting holistic understanding and higher-order thinking skills among learners. As we embark on this journey, we'll uncover the synergies between interdisciplinary approaches and CLIL methodologies, shedding light on innovative strategies for designing educational materials that are both enriching and effective in today's diverse and interconnected world.

1. Statement of the problem

CLIL, or Content and Language Integrated Learning, is a teaching method that instructs subjects in a foreign language with the dual goal of developing content and language competences. The integration of interdisciplinarity into CLIL is seen as advantageous, offering authentic contexts for language learning and opportunities for cross-curricular connections and cultural awareness. Various projects and studies, such as the analysis by Ana Isabel García Abellán and the proposal of a specialized course by Rita Maria de Souza Couto and Cristina Portugal, exemplify the exploration of interdisciplinarity in the design of CLIL didactic materials, particularly in primary education. Meanwhile, Jillianne Code and Valerie Irvine discuss considerations and challenges in designing for interdisciplinarity in higher education. Despite these positive examples, interdisciplinarity in CLIL materials in Algerian universities, especially at Khenchela University, presents challenges such as coordination among teachers, finding relevant topics, and assessing learning outcomes. The overarching aim of applying interdisciplinarity in CLIL material design is to enhance both content and language learning outcomes while fostering critical thinking, creativity, and collaboration skills among students. Strategies like using a backward design framework are recommended to provide teachers with effective support and guidance in this process.

The integration of Content and Language Integrated Learning (CLIL) into the Biology curriculum at the English department of Abbes Laghrour University, specifically for Master One students, raises several challenges and opportunities. The current state of CLIL didactic material design in this academic setting warrants an in-depth examination, particularly with a focus on the role of interdisciplinarity. This study aims to explore the effectiveness of incorporating interdisciplinary approaches in the creation of CLIL materials for Biology courses in English. The identified challenges may include the coordination and collaboration among Biology and English language instructors,

2. Background of the Research

CLIL, or Content and Language Integrated Learning, involves teaching subjects in a foreign language, while interdisciplinarity integrates knowledge from diverse disciplines to enhance understanding of complex subjects. The role of interdisciplinarity in CLIL material design is to deepen the learning experience, promoting critical thinking and collaboration skills. However, perspectives on its role vary, leading to potential areas for further exploration, such as evaluating the effectiveness and impact of interdisciplinarity in CLIL contexts and identifying best practices for material selection and creation. Despite a lack of clarity, there is a call for research on implementation strategies across diverse educational contexts, investigating the impact of interdisciplinary approaches on student engagement, language acquisition, and subject-specific understanding. Addressing this research gap is crucial for refining instructional practices, advancing teaching methodologies, and influencing educational policy and curriculum development in the broader context of CLIL implementation.

The research on "the role of interdisciplinarity in the design of CLIL didactic materials" has gained prominence as scholars and educators recognize the potential benefits of integrating diverse disciplinary perspectives in language education. Scholars such as Ana Isabel García Abellán have conducted analyses of activities combining CLIL and interdisciplinary approaches, concluding that this integration offers several educational advantages. Furthermore, Rita Maria de Souza Couto and Cristina Portugal have proposed a specialization course, 'Design of Didactic Material: a multidisciplinary experience,' providing professionals with methods and techniques for creating interdisciplinary CLIL materials.

Additionally, research by Jillianne Code and Valerie Irvine explores the considerations and challenges of designing for interdisciplinarity in higher education, using a case study of a graduate program in technology and learning. This body of research not only addresses the theoretical aspects but also delves into practical strategies and challenges associated with incorporating interdisciplinarity into CLIL didactic materials, contributing valuable insights for educators and researchers alike.

3. Research Questions

1. How does the extent of interdisciplinarity in current CLIL didactic materials influence their effectiveness in enhancing students' comprehension levels?
2. What is the effect of using interdisciplinary CLIL materials on students' comprehension abilities in various subject areas?
3. In what ways does the integration of interdisciplinarity in CLIL didactic materials contribute to the development of students' critical thinking skills?

These questions aim to explore the relationship between interdisciplinarity and the effectiveness of CLIL materials in enhancing both comprehension and critical thinking skills among students.

Objectives :

1. To examine the extent of interdisciplinarity in current CLIL didactic materials upon analysis.

2. To affect students' comprehension levels in the context of CLIL.

3. To assess the impact of interdisciplinarity on the cultivation of critical thinking skills among students utilizing CLIL materials.

4. Research Hypothesis

Hypothesis: The incorporation of interdisciplinary elements in the design of CLIL didactic materials will positively correlate with improved student learning outcomes, as measured by increased comprehension and enhanced critical thinking abilities

This research will specifically investigate the hypothesis among Master One students in the Department of Biography at Abbes Laghrour University. The focus is on assessing the impact of integrating interdisciplinary elements into CLIL didactic materials on the learning outcomes of these students, with a keen interest in observing heightened comprehension levels and the development of enhanced critical thinking abilities within this specific academic context.

5. Methodology

To reach our objectives we opted for convergent parallel mixed methods design to get a comprehensive picture about the situation. Both quantitative data from students as well as qualitative data from teachers and documents were collected.

Population and sampling

-Master I Students department of Biology total number : (40)

-Subject Teachers of biology total number : (05)

Data gathering tools

The study employs two primary data gathering tools: interview and questionnaire. Here's a detailed description of each tool, its purpose, and how it aligns with the definitions of these data gathering methods:

1. Teacher Interviews

According to Kvale (1996), interviews are a method of collecting qualitative data through direct interaction between the researcher and the participant. They are designed to explore participants' perspectives, providing in-depth understanding and detailed insights. In this study, the interviews are used to understand teachers' views on interdisciplinarity in CLIL materials __The interviews were conducted with five Biology department teachers at Abbes Laghrour University, Khenchela. These interviews consisted of nine open-ended questions.

The purpose was to gather qualitative data reflecting teachers' insights and considerations related to the role of interdisciplinarity in CLIL (Content and Language Integrated Learning) didactic materials.

2. Student Questionnaires

As defined by Bird (2009), a questionnaire is a research instrument consisting of a series of questions for the purpose of gathering information from respondents. Questionnaires are

typically used to collect quantitative data, which can be statistically analyzed. In this research, the questionnaire measures students' agreement, disagreement, or uncertainty on various aspects related to interdisciplinarity in CLIL materials.

The questionnaire was administered to Master's students in the Biology department at Abbes Laghrour University, Khenchela. It included an introduction explaining the research scope and aim, followed by 21 closed-ended questions divided into four sections: Knowledge of Interdisciplinarity, Critical Reflection, Collaboration, and Communication.

The purpose was to gather quantitative data from students regarding their perceptions and experiences with interdisciplinarity in CLIL didactic materials.

By utilizing these two data gathering tools, the study aims to obtain a comprehensive understanding of the role of interdisciplinarity in CLIL didactic materials from both teachers' and students' perspectives. The mixed methods design allows for the integration of qualitative and quantitative data, providing a richer and more nuanced picture of the research topic.

6. Significance of the study

Research on the role of interdisciplinarity in the design of CLIL (Content and Language Integrated Learning) didactic materials can benefit educators, curriculum developers, and language learners. Educators can gain insights into effective strategies for integrating content and language instruction, enhancing their teaching methods. Curriculum developers can use the findings to create more holistic and engaging materials that promote both language acquisition and subject understanding. Language learners benefit by experiencing a more immersive and contextually rich learning environment, facilitating a deeper understanding of both language and content.

The purpose of researching the role of interdisciplinarity in the design of CLIL didactic materials is to understand how integrating content and language instruction can enhance the learning experience. This research aims to identify effective methods and strategies for developing materials that promote both language proficiency and subject matter comprehension. Ultimately, the goal is to improve educational practices, providing educators and curriculum developers with insights to create more comprehensive and engaging learning materials in the context of Content and Language Integrated Learnin

7. Limitaion of the study

The exploration of "The Role of Interdisciplinarity in the Design of CLIL Didactic Materials" faces several potential limitations. Challenges include the difficulty in delineating clear boundaries between disciplines, the search for suitable interdisciplinary resources, and the requisite expertise in multiple fields for effective material design. Methodological challenges may arise when assessing the impact of interdisciplinary approaches on learning outcomes. Another limitation pertains to the potential lack of generalizability if the study focuses on a specific geographic region, educational level, or cultural context. The scope of the research and its applicability beyond the specific context should be acknowledged. Additionally, limitations related to sample size and participant composition may affect the diversity and external validity of findings. The study might be prone to self-reporting bias, with participants aligning responses with perceived expectations. Time constraints and the dynamic nature of educational practices may render the study a snapshot in time, necessitating acknowledgment of the temporal aspect of the findings. Transparent recognition and discussion of these limitations contribute to the study's overall rigor and credibility, ensuring a nuanced understanding of potential constraints.

8. Dilimitation of the study

The scope of the study could involve investigating the impact of interdisciplinary approaches on the effectiveness of CLIL (Content and Language Integrated Learning) materials across diverse educational settings. This includes exploring how collaboration between different disciplines influences the design, implementation, and outcomes of CLIL didactic materials. The study may analyze case studies, educational contexts, and pedagogical strategies to provide insights into optimizing interdisciplinary elements in CLIL material development. It encompasses examining various disciplines' contributions to CLIL design and their impact on language acquisition and content understanding

9. Definitions of the key terms

- **Interdisciplinarity :** It is the combination of several scientific or academic disciplines to address a complex problem or topic , refers to the combination of two or more academic, scientific, or artistic disciplines into a single activity or research project. It draws knowledge from various fields, such as sociology, anthropology, psychology, economics, and more . From Merriam-Webster

- **CLIL:** It is the acronym for Content and Language Integrated Learning, which refers to a pedagogical approach where a foreign language is used as a means of teaching and learning a non-linguistic subject.

It is an approach to teaching and learning where subjects are taught through a foreign language with dual-focused aims, namely the learning of content and the simultaneous learning of a foreign language.

-**Didactic materials**: refer to any resources designed to aid students in their learning experience. These materials help improve students' knowledge and understanding through manipulation and experience. They can include textbooks, visual aids, multimedia presentations, and hands-on activities . From The Edvoca*te. (2021.).* A Guide to Didactic Materials.

10. Structure of the work

This structured outline delineates a comprehensive framework for the study, beginning with an introduction elucidating the investigation's focus on the role of interdisciplinarity in CLIL didactic materials within Algerian universities, specifically Khenchela University. Chapter One provides an in-depth understanding of CLIL and interdisciplinarity, tracing their historical contexts, theoretical underpinnings, and impacts on student learning outcomes. Chapter Two delves into teachers' perspectives, garnered through interviews, on interdisciplinarity in CLIL didactic materials, analyzing factors such as satisfaction, coordination, and resource availability, and explores students' viewpoints on interdisciplinary collaboration through a questionnaire, addressing aspects like critical reflection and communication. The subsequent Discussion of Findings synthesizes insights from both teachers and students, identifying strengths, challenges, and recommendations for enhancing CLIL effectiveness. General recommendations and specific directives for teachers and students are outlined to foster interdisciplinary collaboration, improve evaluation processes, promote critical reflection, enhance communication skills, and optimize resource allocation. The conclusion encapsulates key findings, implications, and suggestions for future research, encapsulating the study's overarching objectives and contributions.

Chapter One

Introduction

Content and Language Integrated Learning (CLIL) refers to an educational approach that employs a foreign language as the primary medium of instruction for subjects like science, history, or art . The core objective of CLIL is to simultaneously foster both content knowledge and language proficiency in learners, along with cultivating intercultural awareness and critical thinking skills. This approach holds considerable importance in language education due to its numerous advantages. Learners engaging in CLIL benefit from heightened motivation and engagement as they delve into topics of personal interest . Furthermore, their linguistic competence is enriched through the meaningful acquisition of new vocabulary, grammar, and discourse skills within relevant contexts . The cognitive skills of CLIL learners are also advanced as they navigate and produce information in authentic and challenging ways. Additionally, CLIL contributes to greater cultural awareness by encouraging exploration of diverse perspectives and values through both content and language acquisition. As education continues to evolve, CLIL proves relevant in preparing learners for a globalized, multilingual world, equipping them with effective communication skills across disciplines and cultures.

Interdisciplinarity involves the integration of knowledge, methodologies, and viewpoints from diverse disciplines to tackle complex problems or questions. This concept plays a pivotal role in enhancing CLIL didactic materials by contributing to a more comprehensive understanding of the content. By connecting different aspects and dimensions of a topic, interdisciplinarity provides a holistic view. Moreover, it fosters the development of higher-order thinking skills, requiring learners to engage in analysis, synthesis, evaluation, and creativity as they compare, contrast, and integrate information from varied sources and perspectives. The incorporation of interdisciplinarity into CLIL also has the potential to elevate learner motivation and engagement by allowing exploration of relevant, meaningful, and interesting topics, enabling the application of acquired knowledge to real-world situations. Additionally, interdisciplinarity enriches the language learning experience by exposing learners to a diverse range of linguistic forms, functions, and registers, encouraging authentic communication and collaboration in the language learning process.

I. 1. Historical Context of CLIL

A. Historical overview of CLIL and its evolution in language education.

According to Hemmi and Banegas (2021), CLIL (Content and Language Integrated Learning) is an educational methodology established in the mid-1990s that has a fascinating trajectory: Originating from a European multilingual policy, CLIL was initially designed to enhance citizens' proficiency in three European languages, fostering economic growth and European integration. Its roots trace back to bilingual programs in Canada and multilingual education initiatives in European countries like the Netherlands, Finland, and Sweden. The term "CLIL" was coined in 1994, gaining traction in European Commission plans to promote multilingualism. Early implementations occurred in secondary schools across Europe, where subjects were taught through an additional language. Initially focused on multilingualism, CLIL has evolved into a methodology predominantly associated with English language instruction. Extensive research across education, linguistics, and psychology has supported its global dissemination. Today, CLIL finds application in diverse educational contexts worldwide, including Japan, Spain, Colombia, and Taiwan. In essence, CLIL's rich history spans from its European inception to its global impact, shaping language education practices across continents.

B. Key milestones, theoretical frameworks, and pedagogical approaches that have shaped CLIL.

As stated by Masih, J. (1999) in *Learning Through a Foreign Language: Models, Methods and Outcomes* (CILT), emerging in the 1990s, CLIL revolutionized education by seamlessly intertwining language acquisition with subject matter instruction. A pivotal moment arrived with the 1999 publication of *Learning Through a Foreign Language*, which explored CLIL models and pedagogies. Furthermore, Gabillon, Z. (2020) in *Revisiting CLIL: Background, Pedagogy, and Theoretical Underpinnings* states that CLIL transcends mere language instruction; it aims to cultivate not only language proficiency but also deep content knowledge, problem-solving abilities, and critical thinking skills. Drawing from sociocultural and cognitive perspectives, CLIL incorporates theories that highlight the

significance of social interaction, cultural context, and simultaneous content-language processing. The 4Cs Framework and Coyle's Language Triptych offer theoretical scaffolding for understanding CLIL's intricate dynamics and its role in contemporary language education. Pedagogical approaches within CLIL embrace innovative strategies to facilitate effective learning. The concept of Scaffolding involves offering temporary support, utilizing visuals, graphic organizers, gestures, questions, and feedback to guide learners towards achieving specific learning goals. Task-based Learning engages learners in meaningful, communicative tasks demanding the application of both content and language knowledge, fostering problem-solving, project work, and simulations. Furthermore, Cooperative Learning organizes learners into small groups, assigning roles and responsibilities for collaborative engagement in tasks such as jigsaw activities, think-pair-share, and peer tutoring. This exploration unravels the rich tapestry of CLIL, unveiling its evolution through pivotal milestones, theoretical foundations, and pedagogical innovations.

I. 2. Foundations of Interdisciplinarity

A. Definition of interdisciplinarity and its theoretical foundations.

Interdisciplinarity represents an approach in both research and education that amalgamates perspectives and methodologies from diverse disciplines to tackle intricate issues or questions extending beyond the confines of any single field. Moreover, interdisciplinarity serves as a critical examination of the assumptions, constraints, and consequences inherent in disciplinary knowledge and practices. As mentioned by Mäki (2016), interdisciplinarity is investigated through the lens of Philosophy of Interdisciplinarity (PhID), which explores the comparative and contactual aspects of scientific disciplines and draws from philosophy of science, including models, explanations, and values, while integrating social epistemology and ontology (Philosophy of interdisciplinarity. What? Why? How? European Journal for Philosophy of Science, 327–342). In keeping with Boix Mansilla (2006), Unity of Knowledge Theories from Logical Positivism to contemporary complexity theories provide a framework for interdisciplinary work by facilitating the intersection of different disciplines to understand complex phenomena (Interdisciplinary Learning: A cognitive-epistemological foundation). Following Frodeman, Klein, and Mitcham (2018), epistemological inquiry across various scholarly domains underscores the importance of

understanding interdisciplinary foundations for effective collaboration and knowledge integration (The Oxford Handbook of Interdisciplinarity. Oxford University Press). Distinguishing interdisciplinarity from related concepts like multidisciplinarity and transdisciplinarity, researchers explore the nature of disciplines and their interactions, highlighting interdisciplinarity as crucial in contemporary science with significant theoretical implications for interdisciplinary practice.

B. Seminal works and key thinkers in the field of interdisciplinarity.

1. Understanding Interdisciplinarity:

An article in the *Oxford Research Encyclopedia of International Studies* examines the methodological, theoretical, and institutional implications of interdisciplinary approaches. It discusses how interdisciplinarity emerged in the 1970s as a response to disciplinary fragmentation, aiming to integrate insights from multiple disciplines to comprehend complex social phenomena.

2. Influential Figures in International Theory:

While not exclusively focused on interdisciplinarity, a book highlights four influential thinkers in international theory: Machiavelli, Grotius, Kant, and Mazzini. Their works have left a lasting impact across various fields, including interdisciplinary studies.

3. Pioneering Conference on Interdisciplinarity:

A report from the first International Conference on Interdisciplinarity, sponsored by the OECD in 1972, remains significant in the field. Titled *Interdisciplinarity: Problems of Teaching and Research in Universities*, it addressed challenges related to interdisciplinary education and research.

4. Interdisciplinary Learning in Area Studies:

According to Klein (2023), exploring the role of interdisciplinary engagement in area studies emphasizes integrative learning focused on addressing significant questions and real-world challenges. While not exhaustive, it underscores the importance of interdisciplinary approaches within specific domains (Klein, J. T., n.d.). Conception and Interpretation of Interdisciplinarity in Research: Authored by Katharina Rietzler and colleagues in 2023, this

recent article explores how researchers across different career stages perceive, learn, and engage in interdisciplinarity within the emerging field of digital transformation research (DTR). The work provides valuable insights into the complexities of interdisciplinary collaboration and communication, shedding light on both challenges and opportunities in this evolving landscape.

I. 3. Intersection of CLIL and Interdisciplinarity

A. Studies or Theories that explicitly connect CLIL with interdisciplinarity.

CLIL, an abbreviation for Content and Language Integrated Learning, refers to an instructional approach that utilizes a foreign language as the medium for teaching subjects unrelated to language. Concurrently, interdisciplinarity involves the amalgamation of knowledge and methodologies from diverse disciplines to address intricate issues or inquiries.

Numerous studies and theories explicitly link CLIL with interdisciplinarity, such as: Based on Klein, J. T. [Interdisciplinarity: Its meaning and consequences. Oxford Research Encyclopedia of International Studies] Exploring Interdisciplinary Curriculum and Learning in Higher Education, which investigates the role of CLIL in promoting interdisciplinary thinking and skills among both students and educators in higher education contexts.

A Theoretical Framework for Designing Interdisciplinary Undergraduate Courses, outlining the process of designing and implementing a CLIL-centered interdisciplinary course utilizing principles of social constructivism, academic motivation, and diversity perspectives by Alberich i Carramiñana, J., & Florit Ballester, C. [THEORETICAL FRAMEWORK OF CLIL, AN OVERVIEW CLPI AICLE iniciació primària CLSI AICLE iniciació secundària. Department d'Ensenyament].

Examining Integration and Interdisciplinarity: Concepts, Frameworks, and Instances, delving into the challenges and prospects associated with incorporating interdisciplinary approaches in policy analysis and decision-making. Additionally, the study provides instances of CLIL-based projects addressing environmental and social concerns. Keeping with Klein, J. T. (2015) [Interdisciplinarity: Its Meaning and Consequences. Oxford Research Encyclopedia of International Studies].

B. How interdisciplinary approaches have been integrated into CLIL methodologies.

As stated by Klein, J. T. (2018). *Interdisciplinarity: Its Meaning and Consequences. Oxford Research Encyclopedia of International Studies*, Content and Language Integrated Learning (CLIL) represents a pedagogical approach focused on competency development, aiming to seamlessly teach both subject matter and language in an integrated manner. The foundation of CLIL draws inspiration from diverse interdisciplinary methodologies, including bilingual education, genre and register analysis, sociolinguistics, systemic functional linguistics, and sociocultural theories of language and literacy development. Interdisciplinary approaches have been embedded into CLIL methodologies through various means:

- Shifting the perspective of language from a subject of study to a tool for learning and communication. In this approach, language is implicitly taught through content rather than through explicit grammar rules and vocabulary lists.

- Applying a sociolinguistic outlook acknowledging the diversity and variation in language usage across contexts and communities. Learners are exposed to and encouraged to use various language varieties and registers, including formal and informal, academic and everyday, standard and non-standard.

- Utilizing systemic functional linguistics to analyze how language choices relate to the field, tenor, and mode of communication. This analysis aids learners in making informed and effective language choices tailored to different situations and purposes.

- Integrating sociocultural theories of language and literacy development, emphasizing the significance of social interaction, scaffolding, mediation, and collaboration in learning. Learners engage in meaningful and authentic tasks that necessitate using language to construct and share knowledge with others.

- Embracing a genre-based pedagogy concentrating on the linguistic features of different text types, such as reports, explanations, and narratives. This facilitates learners in comprehending and producing texts suitable for diverse purposes and audiences by Nikula, T., Dafouz, E., Moore, P., & Smit, U. (Eds.). (2016). Conceptualising Integration

I. 4.Summarize studies that investigate the impact of interdisciplinarity in CLIL on student learning outcomes.

According to Talukder, B. (2019), the possibility of introducing an interdisciplinary approach to English language classrooms in Bangladesh. It provides insights into the historical context of English language education in the country, emphasizing its colonial roots and continued importance in the national curriculum. The study, involving over 30 million students, advocates for a multifunctioning method that simultaneously enhances language skills and disciplinary knowledge. By transforming activities from prevalent methods like the Grammar Translation Method (GTM) and Communicative Language Teaching (CLT), the paper proposes interdisciplinary activities, initially recommended on a limited scale.

As mentioned by Pancheva, T., & Antov, P. (2017), the application of Content and Language Integrated Learning (CLIL) in engineering education, particularly in tertiary institutions, is noteworthy. While technical universities traditionally focus on specialized engineering subjects, the paper argues for the increasing importance of language and communication skills for technical graduates. It presents results from implementing CLIL in teaching students at the Faculty of Forest Industry, showcasing benefits such as improved language skills, increased participation, and positive attitudes toward engineering subjects. The study concludes that CLIL in higher engineering education contributes to confident learners, enhanced cognitive processes, and improved communication skills.

Referring to Ayapova, T., Kemelbekova, Z., Bukabaeva, B., Abdrakhimova, G., Erzhanova, G., Saifutdinova, A., Aitkazy, S., & Kasymbekova, A.'s study on the experience of implementing the methodology of Content and Language Integrated Learning (CLIL) at the Training and Retraining Center for CLIL Teachers in Kazakhstan, it is evident that the center plays a crucial role in addressing challenges related to language proficiency among subject teachers in higher education. The study underscores the importance of adopting a unified CLIL model to overcome language barriers, enhance English proficiency, and provide methodological training for teachers. Through a review of global practices in CLIL training, an analysis of the local context in Kazakhstan, and a presentation of the center's activities and outcomes, the paper contributes valuable insights into the advancement of CLIL pedagogy.

Following Gimeno, Seiza, de Siqueira, and Martínez (2010), the integration of Content and Language Integrated Learning (CLIL) in higher technical education using the InGenio online multimedia authoring tool emphasizes the importance of language proficiency alongside technical knowledge for effective communication in the international context. The authors explore the benefits of combining CLIL and technology-enhanced learning, presenting InGenio as a web-based tool to implement communicative CLIL in teaching English for Specific Purposes (ESP) to Industrial Engineering students. The paper concludes that InGenio facilitates the dual purpose of teaching subject matter and a foreign language.

Based on Marsh and Frigols Martín's introduction to Content and Language Integrated Learning (CLIL), which serves as a comprehensive overview of the subject, CLIL emerges as a response to the increasing global demand for teaching subjects in English. This educational approach emphasizes both content and language learning outcomes, thereby challenging traditional language teaching methods. The article delves into CLIL's impact on educational practices, the various implementations it undergoes, and the reasons behind its adoption, such as diversifying classroom practices, fostering intercultural knowledge, and enhancing learner motivation. Marsh and Frigols Martín view CLIL as a significant advancement in English language teaching, capable of reshaping EFL (English as a Foreign Language) practices, while also acknowledging the challenges and opportunities associated with its effective implementation.

The document "Interdisciplinary Team Teaching and Content and Language Integrated Learning (CLIL)" (2015), within the context of the 'PROJECT TOOLS FOR SKILLS – INTEGRATED LEARNING OF ENGLISH AND FORESTRY – TEACHER TRAINING', emphasizes the integration of methods from various academic disciplines to address real-world issues, fostering cognitive development and skills like critical thinking and ethical awareness (Interdisciplinary Team Teaching and CLIL, 2015). Highlighting the six key elements of significant learning, the text underscores their role in challenging preconceptions and promoting diverse perspectives. The transition to interdisciplinary teaching is considered cost-effective, involving pre-instructional planning and effective assessment methods such as pre-and-post student surveys and grading rubrics. Challenges for interdisciplinary teachers include acquiring knowledge in related disciplines and convincing students of the value of interdisciplinary thinking. The document also explores the benefits of interdisciplinary team

teaching, emphasizing increased student participation and collaborative course planning. Additionally, it delves into CLIL, discussing its aims, competencies, challenges, and curriculum development, concluding with positive outcomes like enhanced cognitive processes and intercultural understanding resulting from CLIL education.

Chettiparamb (2007) underscores the growing significance of interdisciplinarity in policy, teaching, and research, with a focus on the UK context. The literature review discusses the acceptance and promotion of interdisciplinarity in policy circles and educational bodies, examining the reasons behind its perceived desirability and inevitability. The report is structured into five sections covering disciplinarity, interdisciplinarity, practice, interdisciplinary teaching, and the higher education policy context in the UK. The text reviews the historical development and characteristics of disciplines, explores various types of interdisciplinarity, and provides insights from an OECD cross-national survey on the motives and goals of interdisciplinarity in universities. It further delves into interdisciplinary teaching, summarizing goals, curriculum, challenges, and case studies. Addressing higher education policy in the UK, the text analyzes external compulsion towards interdisciplinarity, warns against potential risks, and advocates for a rigorous self-reflexive analysis of interdisciplinarity as both an intellectual and political endeavor. In conclusion, the text highlights the increasing importance of interdisciplinarity while cautioning about potential risks, particularly concerning external influences on academic institutions.

I. 5. Exploration of Discoveries in Language Acquisition, Subject Understanding, Critical Thinking Skills, and Other Pertinent Learning Goals

2. **The Effectiveness of Literature on Acquisition of Language Skills and Intercultural Understanding in the High School Context**:

   This research report, conducted by Duncan and Paran (2017) under the auspices of the International Baccalaureate (IB) Organization, delves into the influence of literature on language acquisition and intercultural comprehension within high school environments. While not explicitly addressing the phrase you provided, the study thoroughly examines the role of literature in fostering language learning and its advantageous effects on learners.

3. **Navigating Digital Learning Landscapes: Unveiling the Role of Blended Learning**:

   While not directly related to CLIL, Wei (2023) discusses blended learning and its impact on language acquisition and critical thinking. It emphasizes the learner's perception of blended learning.

4. **Through Guided Inquiry-Based Learning**:

   This study focuses on critical thinking skills and how guided inquiry-based learning can enhance them. Although it doesn't specifically address interdisciplinary approaches, it highlights the importance of critical thinking in education. According to Mardi, & Fauzi, A., & Respati, D. K. (2021), which investigated the development of students' critical thinking skills through guided discovery learning (GDL) and problem-based learning models (PBL) in accountancy education, critical thinking skills can be nurtured through various pedagogical approaches.

5. **Cognitive and Behavioral Approaches to Language Acquisition: Conceptual Consistency and Empirical Advancements**:

   This paper reviews cognitive theories related to language acquisition. While it doesn't directly mention interdisciplinary approaches, it provides insights into language development and learning (Dale, 2004).

6. **Critical Periods for Language Acquisition: New Insights with Particular Reference to Bilingualism Research**:

This article discusses the critical period hypothesis (CPH) for language acquisition. Although it doesn't directly relate to CLIL, it explores age-related factors in language learning and attainment (Abutalebi & Clahsen, 2018).

6. Challenges and Opportunities

A. Examining Literature on the Difficulties Encountered in Incorporating Interdisciplinarity into CLIL Instructional Materials

Based on what was written by Knotts, G., Henderson, L., Davidson, R.A., & Swain, J.D. (2009) in "The search for authentic practice across the disciplinary divide" published in College Teaching (pp. 188-196), the investigation involved four first-year faculty members. Each of them explored and evaluated their teaching philosophies, strategies, and roles as educators and researchers, utilizing Bain's definition of authentic teaching and learning, known as the "natural critical learning environment." The study identified four elements of authentic teaching and learning that transcend disciplinary boundaries:

1) being present in the classroom.
2) awareness and utilization of context.
3) active engagement.
4) ownership of education for student-centered learning.

A collaborative model of professional development across the disciplinary divide is outlined, as is a model for authentically engaged teaching practices that upholds standards, while revitalizing teaching and learning in the college classroom.

While Richter and Paretti (2009) state that while numerous descriptions of interdisciplinary courses and projects appear in the literature, educators still lack rigorous research about learning barriers, outcomes, and interventions to support this interdisciplinary development. This paper addresses that gap by pairing a review of the literature with a case study of students in a sustainable engineering program to identify the key challenges to success in interdisciplinary contexts. The findings suggest that students

(1) lack the ability to connect interdisciplinary subjects to their own more narrowly defined fields of expertise,

(2) fail to identify and value the contributions of multiple fields to complex problems. This paper concludes with possible teaching interventions to address these barriers.

Keeping with Wade and Stone (2010), who conducted a study on overcoming disciplinary and institutional barriers through an interdisciplinary course focused on economic and sociological perspectives on health issues, the current research aims to delve into the impact of interdisciplinarity on the effectiveness of CLIL didactic materials in enhancing students' comprehension and critical thinking skills.

The authors describe an interdisciplinary course team-taught by an economist and a sociologist. Historically mindful of the less than amicable relationship between these disciplines, these colleagues developed a course that attempted to illuminate the different perspectives of economics and sociology in relation to selected health themes. Such a course is either rare or unique. It served as a general social science (core) requirement and as a major elective for sociology majors. The article describes course mechanics, pedagogy and assessment, course content, and institutional barriers. The article highlights some of the challenges that exist in offering such a course – problems either less severe or nonexistent in more traditional courses.

B. Exploring Opportunities and Innovative Strategies to Surmount Interdisciplinary Integration Challenges in CLIL Didactic Materials

According to Self (2019), "Interdisciplinary: Challenges and opportunities for design education," there are several opportunities and innovative approaches that have been identified to address the challenges associated with integrating interdisciplinarity into CLIL didactic materials (p. 843–876).

- Leveraging technology, including tools like the Moodle plugin "Fair Allocation," to enhance project allocation transparency and efficiency. This plugin optimizes project distribution based on students' preferences and project quotas, streamlining the allocation process.

- Implementing student-centered pedagogical methods that foster a culture of autonomy, such as crafting personalized learning paths, offering real-time feedback, and encouraging discussion and collaboration among students.

- Promoting student autonomy and interdisciplinary learning through engagement in higher-order thinking tasks, including analysis, evaluation, and synthesis. This approach also focuses on developing students' problem-solving skills, creativity, and intercultural competence.

- Offering comprehensive training and support for both teachers and learners to cultivate the necessary knowledge, skills, and attitudes for successful interdisciplinary integration. This includes recognizing prior knowledge and skills, scaffolding new concepts, and facilitating the assessment of learning outcomes.

I. 7. Practices and Models

A . Exploring Exemplary Approaches in Designing CLIL Didactic Materials with an Interdisciplinary Focus: A Presentation of Current Studies and Models

Several studies and models exemplify best practices in crafting CLIL didactic materials with an interdisciplinary perspective. Here are a few noteworthy examples:

Enhancing CLIL Didactic Materials for Primary Education through Interdisciplinarity: Investigating the merits of incorporating interdisciplinarity in the design of CLIL materials for primary education, this study assesses various activities that blend CLIL and interdisciplinary approaches. Additionally, it furnishes examples illustrating the advantages of this dual methodology (Froelich, 2015).

Optimizing Instruction through Interdisciplinary Team Teaching and CLIL Formats: Unpacking the concept and advantages of interdisciplinary instruction, this study delineates its application to CLIL. Practical guidelines and tips for effective interdisciplinary team teaching and CLIL-formatted instruction are also provided. Stated by Antov, P., & Pancheva, T. (2016). [What is Interdisciplinary Team Teaching and Content and Language Integrated Learning? University of Forestry, Sofia, Bulgaria.]

Innovative Integration: Interdisciplinary CLIL in Language and STEM Education: This research explores the synergy between CLIL, languages, and STEM subjects, offering examples of interdisciplinary CLIL projects from diverse European countries. Furthermore, it discusses the challenges and opportunities associated with implementing interdisciplinary CLIL in various educational contexts. García Abellán (Year), in their study on the role of interdisciplinarity in the design of CLIL didactic materials for primary education, provides valuable insights into the significance of integrating multiple disciplines within CLIL frameworks.

Insights into CLIL Lesson Framework: This document extensively elucidates the foundational principles and benefits associated with Content and Language Integrated Learning (CLIL). Emphasizing advancements in language proficiency, content knowledge, cognitive skills, and cultural awareness, the article furnishes a sample lesson plan that seamlessly integrates geography and English instruction. The lesson plan adheres to a comprehensive four-stage framework: building knowledge, focusing language, processing the text, and transferring knowledge. Practical advice and recommendations are included to assist educators aiming to incorporate CLIL into their teaching practices. According to García Abellán (2015), the role of interdisciplinarity in the design of CLIL didactic materials for primary education is pivotal in enhancing students' comprehension and critical thinking skills.

Following to In-Depth Analysis of CLIL Materials for Secondary Education: This article presents a detailed case study spotlighting the collaborative efforts of a teaching team in designing and implementing CLIL materials for history and English instruction in a Spanish secondary school. It delves into the project's context, objectives, methodology, and results, offering insights into the challenges and advantages of crafting CLIL materials. Furthermore, the article showcases tangible examples of the materials generated by the educators, including worksheets, quizzes, and presentations. These materials adhere to a framework that seamlessly integrates content, language, cognition, and culture.

In keeping with Revolutionizing Education with Interdisciplinary CLIL Pedagogy: This article investigates the transformative potential of integrating languages and STEM subjects through CLIL, providing examples of innovative interdisciplinary projects from diverse European countries. It delves into pedagogical and technological innovations

that support CLIL, including collaborative learning, inquiry-based learning, gamification, and digital storytelling. The article also addresses the challenges and opportunities associated with implementing interdisciplinary CLIL across various contexts, encompassing aspects such as curriculum design, teacher training, and assessment.

B .How can I adapt my CLIL materials to different proficiency levels?

In reference to Froelich (2015), curricular and didactic conceptions of interdisciplinarity in the field of education offer a socio-historical perspective. He adjusting CLIL materials to varying proficiency levels is a crucial skill for CLIL educators, enabling them to address the diverse needs and capabilities of their students effectively. Several strategies can be employed to tailor CLIL materials, including:

- Streamlining language and content complexity by employing concise sentences, straightforward vocabulary, visual aids, and glossaries.

- Furnishing scaffolding and assistance through clear instructions, illustrative examples, models, and constructive feedback.

- Customizing tasks and material outcomes by presenting learners with options, choices, and challenges aligned with their proficiency level and individual interests.

TKT: CLIL Part 2: Materials selection and adaptation: This article outlines the fundamental principles and advantages of CLIL, providing a sample lesson plan for teaching geography and English. It also offers practical tips and suggestions for the selection and adaptation of materials in CLIL, featuring a sample task from the TKT: CLIL exam.In line with CLIL- Content and Language Integrated Learning. (25.02.2024).

- Simplifying Language and Content: This approach involves minimizing the complexity of language and content to enhance accessibility for learners. Utilizing concise sentences, simpler vocabulary, visuals, and glossaries aids in facilitating a more comprehensive understanding of key subject concepts. Additionally, employing examples and analogies serves to render the content more relevant and engaging.

Content and Language Integrated Learning (CLIL) - Cambridge: This presentation delivers practical advice and ideas for CLIL teachers, covering aspects of planning, teaching, and assessing CLIL lessons. It also touches on materials selection and adaptation, including the effective use of authentic resources, multi-modal input, and integration with other subjects.

Providing scaffolding and support involves offering learners the necessary guidance and assistance to accomplish tasks and attain learning outcomes. Clear instructions, examples, models, and feedback are utilized to aid learners in task performance and progress assessment. Questions, prompts, and hints are also employed to stimulate critical thinking and enhance language skills (Antov & Pancheva, 2016).

Do-It-Yourself CLIL: Designing Materials and Lessons: This article explores the benefits and challenges of creating personalized CLIL materials, as opposed to relying on published resources. It provides guidelines and steps for designing CLIL materials and lessons, based on a framework that considers the dimensions of content, language, cognition, and culture.

Differentiating Tasks and Outcomes: This strategy entails presenting learners with diverse options and challenges to align with their proficiency level and individual interests. Offering choices in topics, formats, and resources for tasks, as well as incorporating varying levels of difficulty, complexity, and creativity in outcomes, empowers learners to self-challenge and demonstrate their learning.

These practices are aligned with the principles and benefits of CLIL, such as enhancing the learners' content knowledge, language competence, cognitive skills, and cultural awareness. They are also consistent with the interdisciplinary approach, as they help the learners connect and integrate different subjects and languages, and develop a holistic and critical view of the world.

I. 8 . Geographical and Cultural Contexts

A. Exploring the Influence of Interdisciplinarity in CLIL within Distinct Geographical and Cultural Setting

Interdisciplinarity in CLIL represents an approach aimed at seamlessly integrating various subjects and languages, fostering a comprehensive and critical understanding of the world. Numerous literary sources delve into the role of interdisciplinarity in CLIL within specific geographical or cultural contexts, and some noteworthy examples include:

As mentioned by Hemmi and Banegas (2021), in their comprehensive overview of CLIL, the chapter provides a detailed introduction to the origins, theories, definitions, features, and research surrounding CLIL. It explores CLIL as a response to the global need for multilingualism and multiculturalism, influenced by cognitive, sociocultural, and linguistic perspectives. The chapter defines CLIL as a dual-focused approach enhancing both content and language learning, highlighting key features such as authenticity, scaffolding, and interculturality. The overarching book reviews main research findings and challenges of CLIL, reflecting unique contexts in nine countries globally, offering insights into historical, political, and educational backgrounds, along with examples of CLIL practices and projects.

In accordance with what been written in Promoting Intercultural Competence Through Children's Literature (05.02.2024) emphasizes the role of children's literature in developing intercultural competence within CLIL. It defines intercultural competence in the context of CLIL's aims and principles and advocates for the use of children's literature as a valuable tool. The chapter illustrates how integrating children's literature with various subjects and languages can expose learners to diverse perspectives, values, and experiences, fostering curiosity, empathy, and critical thinking. Practical examples are provided, including suggestions for text selection, adaptation, task design, and outcome assessment based on the content, language, cognition, and culture framework of CLIL.

According to Hemmi and Banegas (2021), their book, *International Perspectives on CLIL*, offers a critical examination of CLIL practice and research. The book is praised for its diverse case studies spanning various countries, which delve into crucial CLIL topics like teacher education, curriculum development, materials design, and assessment. While the review lauds the book's structured approach, thematic coherence, and practical implications, it

also identifies shortcomings in theoretical depth and comparative analysis. The critique underscores the need for further investigation into areas such as the integration of interdisciplinarity, technology, and learner autonomy within CLIL contexts, as well as advocates for the expansion of longitudinal studies to better understand CLIL's long-term impact (Hemmi & Banegas, 2021, pp. 1-20).

Based on insights from Rekers and Hansen (2015), analyzing the establishment of an interdisciplinary research center in geography, emphasizing its motivations, benefits, and challenges. Established as a collaborative initiative between the University of Helsinki and the University of Oulu, the center focuses on global environmental change and sustainability. The article explores the motivations for interdisciplinary research, such as addressing complex problems and generating innovation, and discusses associated challenges, including communication gaps and institutional constraints. It provides examples of overcoming these challenges through creating a shared vision, building trust, and fostering a collaborative culture. The article concludes by highlighting the center's achievements, offering recommendations for future interdisciplinary projects, including diverse partnerships, clear goals, and adequate support.

Some examples of CLIL practices in Algeria

CLIL, which stands for Content and Language Integrated Learning, is an educational approach that combines content knowledge with language learning. This method has been implemented in various Algerian higher education institutions, particularly in the fields of technology and geography. The following summaries provide an in-depth understanding of key sources discussing CLIL practices in Algeria:

As asserted by Kouider (2023), the potential advantages and challenges associated with CLIL in the Algerian context are discussed. The article suggests strategies to overcome barriers hindering successful CLIL adoption, emphasizing the importance of policies, resources, qualified teachers, and stakeholder support (Kouider, 2023). The author concludes by highlighting how breaking down these barriers can create a more dynamic learning environment, better preparing Algerian Higher Education Institutions' students for the demands of a globalized world.

In agreement with Melouah (2023), the effectiveness of CLIL as an innovative approach in Algeria is highlighted, focusing on students' attitudes and perceptions toward learning English in the technology faculty at the University of Medea. Results indicate positive impacts on content knowledge, language proficiency, motivation, and confidence (Melouah, 2023, p. 32-45). The paper concludes with implications and recommendations for CLIL practice and research in Algeria, suggesting improvements to the curriculum, materials, and assessment, as well as advocating for more longitudinal and comparative studies.

Following Kouider's (2023) analysis of the formation of an interdisciplinary research center in geography, established to address global environmental change and sustainability issues using CLIL, it is evident that the center, a joint initiative between the University of Helsinki and the University of Oulu, demonstrates the motivations, benefits, difficulties, and obstacles of interdisciplinary research. Kouider highlights how CLIL is employed to integrate languages and STEM subjects, emphasizing the positive impacts of overcoming disciplinary boundaries and institutional constraints through international collaboration (pp. 319-331).

According to the research paper titled "Implementation of Content and Language Integrated Learning (CLIL) in Teaching English to Technical Students in Algerian Higher Education," findings from an experimental study comparing the impact of CLIL and traditional teaching methods on English language instruction for technical students at the University of Medea's technology faculty in Algeria reveal significant improvements. Results indicate that students exposed to CLIL instruction exhibited significant enhancements in English language proficiency, content knowledge, and attitudes towards English compared to those receiving traditional instruction. The paper concludes that CLIL represents an effective and innovative approach capable of enhancing learning outcomes and motivation among technical students in Algeria.

Exploring Cultural Nuances: Addressing Variations and Adaptations in the Role of Interdisciplinarity within CLIL in Algeria :

This question delves into a multifaceted and intriguing aspect of education. Content and Language Integrated Learning (CLIL) is a pedagogical approach designed to merge the acquisition of subject matter and a foreign language, such as the combination of geography and English within a single classroom setting. While CLIL offers numerous benefits, such as

enhancing language skills, content knowledge, intercultural competence, and motivation among students, it also presents formidable challenges, particularly in environments marked by cultural disparities between the subject matter and language or between educators and learners.

One significant challenge in the realm of CLIL is the necessity to adapt curricula and pedagogical methods to local contexts, carefully considering cultural nuances that may influence the learning process and outcomes. For instance, certain topics or concepts may be more familiar or pertinent to students based on their background, interests, and values. The effectiveness or appropriateness of teaching methods and activities may vary depending on students' learning styles, preferences, and expectations. Similarly, the fairness or validity of assessment criteria or standards may differ based on students' goals, abilities, and achievements.

Another formidable challenge in CLIL is the cultivation of interdisciplinarity, emphasizing collaboration and integration across different fields of knowledge such as languages, sciences, humanities, and arts. While interdisciplinarity enriches the quality and creativity of CLIL by providing diverse perspectives, methods, and resources, it demands a high degree of coordination, communication, and cooperation among educators and students, as well as a coherent framework for the CLIL program.

To navigate these challenges, potential adaptations based on cultural nuances may include:

- Conducting thorough needs and context analyses prior to CLIL program design and implementation, identifying local strengths, weaknesses, opportunities, and threats. This facilitates tailoring CLIL objectives, content, methods, and evaluation to the specific needs and characteristics of students and educators.

Embracing a flexible and dynamic approach to CLIL that allows for adjustments based on feedback and results, respecting the diversity and autonomy of learners and educators.

- Cultivating a culture of dialogue and inquiry in CLIL, fostering the exchange and negotiation of meaning, expression and appreciation of opinions, exploration and questioning

of assumptions, and development and justification of arguments among educators and students across disciplines and languages.

- Providing comprehensive support and training for educators and students engaged in CLIL to enhance their linguistic, content, pedagogical, and intercultural competences, facilitating collaboration and integration within interdisciplinary teams and projects.

I. 9. Educator Perspectives:

A. Exploring Educators' Perspectives: Studies and Surveys on Integrating Interdisciplinarity into CLIL Materials

According to Strachan and Block (2020), interdisciplinary teaching involves the utilization of informational texts to support social studies inquiry in grades 1–3, with a focus on enhancing both content and literacy learning. The authors introduce three guiding principles for interdisciplinary teaching: prioritizing inquiry, selecting texts that encourage comparing perspectives and sources, and providing opportunities for students to write for authentic reasons and audiences. Their article illustrates the application of these principles in two study units centered on the American Revolution and the Civil Rights Movement. Through reading, discussing, and writing about informational texts, students address essential questions such as "Why do people fight for freedom?" and "How do people create change?" (pp. 38-45).

With reference to Khalil, N., Aljanazrah, A., Hamed, G., & Murtagh, E. (2022).[Exploring Teacher Educators' Perspectives of Play-Based Learning: A Mixed Method Approach.] explores how teacher educators in Palestine perceive play-based learning and identifies factors influencing the adoption of this pedagogical approach. Employing the capability approach as a theoretical framework, which centers on what individuals can do and be, the study involved an online survey and interviews with 36 teacher educators from four Palestinian universities. Three main themes emerged: teacher educators value play-based learning and are motivated to apply it; however, they face challenges due to insufficient knowledge, skills, and resources. Additionally, social cues, cultural norms, and physical constraints were identified as factors limiting the opportunity to implement play-based learning.

In the words of Abel, V. R., Tondeur, J., & Sang, G. (2022). [Teacher perceptions about ICT integration into classroom instruction] offers a comprehensive review of literature on how teachers perceive the integration of information and communication technologies (ICT) into classroom instruction. Synthesizing findings from 20 qualitative studies employing various methods like interviews, observations, and focus groups, the article explores teachers' attitudes and beliefs about ICT integration. It discusses both positive and negative perceptions, addressing benefits and challenges, as well as factors influencing teachers' attitudes, such as their characteristics, available ICT resources, the school environment, curriculum, and professional development.

B. Exploring Challenges and Educators' Experiences in Embracing Interdisciplinary Approaches

Interdisciplinary approaches refer to the integration of multiple disciplines or fields of knowledge, encompassing areas such as languages, sciences, humanities, and arts, to explore specific topics or address complex problems. These approaches offer numerous benefits in education, including enhancing the quality and creativity of learning, fostering communication and critical thinking skills, and tackling pertinent issues. Nevertheless, educators face several challenges in implementing interdisciplinary approaches, including:

1. Designing and implementing a cohesive and rigorous curriculum that effectively balances content and methods across different disciplines while aligning with the learning objectives and standards of each discipline.

2. Collaborating and coordinating with educators from diverse disciplines, backgrounds, and perspectives, overcoming potential differences and conflicts arising from the diversity and complexity inherent in interdisciplinary work.

3. Developing and assessing students' interdisciplinary competences and outcomes, such as their ability to integrate and apply knowledge from various disciplines, communicate effectively across disciplines and cultures, and reflect on their learning process and progress.

4. Finding and accessing appropriate resources and support for interdisciplinary teaching and learning, including materials, technologies, training, and recognition necessary to facilitate and sustain interdisciplinary practice.

Educators' experiences in adopting interdisciplinary approaches vary based on the context, purpose, and level of interdisciplinarity involved in their practice. While some educators may find the experience positive and rewarding, others may encounter difficulties and frustrations. Influencing factors include:

1. Educators' motivation and attitude towards interdisciplinary teaching and learning, as well as their willingness and readiness to engage in interdisciplinary work.

2. The knowledge and skills of educators in the disciplines and languages involved in interdisciplinary work, along with their ability and confidence to teach and learn in an interdisciplinary manner.

3. The degree of collaboration and communication among educators and students engaged in interdisciplinary work, including the level of trust, respect, and mutual understanding.

4. The support and guidance educators receive from colleagues, institutions, and communities, as well as the feedback and recognition they obtain for their interdisciplinary work.

I. 10. Methodologies and Assessment

A. Research methodologies used in studies investigating the role of interdisciplinarity in CLIL.

CLIL, or Content and Language Integrated Learning, is an educational approach that combines the teaching of subject content and a foreign language in an integrated manner[1]. A distinctive characteristic of CLIL is its emphasis on interdisciplinarity, involving the integration of diverse disciplines or bodies of knowledge to address complex topics or problems.

Various research methodologies have been employed to explore the role of interdisciplinarity in CLIL, including:

Systematic reviews: These are comprehensive and rigorous analyses of existing literature on a specific topic, utilizing predefined criteria and methods to select, appraise,

synthesize, and report findings[3]. For instance, Laursen et al. (2022) conducted a systematic review of 142 studies, investigating how interdisciplinarity is assessed in different contexts and proposing a simplified model of assessment design choices termed an assessment pathway.

Case studies: These are in-depth investigations of one or more cases, employing multiple sources of evidence and data collection methods such as interviews, observations, and document analysis. Coyle et al. (2010), for example, conducted a case study of a CLIL project in Spain, examining the implementation and perception of interdisciplinarity by teachers and students through questionnaires, interviews, classroom observations, and document analysis.

Mixed methods: This research design combines quantitative and qualitative methods to collect, analyze, and integrate data from various sources and perspectives. This approach aims to address complementary research questions, enhancing the validity and reliability of findings. Pérez-Cañado (2016) utilized a mixed methods approach to assess the effectiveness of CLIL programs in Spain. Data from standardized tests, surveys, interviews, and focus groups involving students, teachers, and administrators were collected and analyzed.

B. Exploring Assessment Methods for Evaluating the Effectiveness of CLIL Didactic Materials with an Interdisciplinary Focus

Portfolio Evaluation: This form of alternative assessment entails gathering and appraising samples of students' work, such as projects, essays, and reports, over an extended period. This approach aims to showcase students' advancements and accomplishments in both content and language learning[12].

Rubric-Based Assessment: This criterion-referenced assessment method employs a scoring guide or matrix to articulate different levels of performance or quality in students' work. This evaluation is based on specific criteria and indicators. Rubrics are versatile tools that can be utilized to assess interdisciplinary skills like critical thinking, problem-solving, and collaboration, in addition to gauging students' content and language knowledge.

Self-Assessment and Peer Assessment: These formative assessment methods engage students in evaluating either their own work or that of their peers, utilizing predefined criteria or checklists. The objective is to offer feedback and identify areas for improvement. Self-assessment and peer assessment not only contribute to fostering students' autonomy and responsibility but also enhance their metacognitive awareness within CLIL contexts.

I. 11. Gaps in the Literature

A. Exploring Gaps, Contradictions, and Limitations in Literature on the Role of Interdisciplinarity in CLIL Studies

some of the gaps, contradictions, or limitations previously highlighted by researchers include:

Ambiguity in Defining and Operationalizing Interdisciplinarity in CLIL: There exists a lack of consensus regarding the definition and operationalization of interdisciplinarity in CLIL contexts. Different researchers and practitioners employ varied terms, such as cross-curricular, multidisciplinary, transdisciplinary, etc., to denote interdisciplinarity, and their interpretations and expectations of its goals and outcomes often differ.

Insufficient Empirical Evidence on the Impact of Interdisciplinarity on CLIL Learning Outcomes: The available body of research lacks robust empirical studies examining the effects of interdisciplinarity on students' content and language learning, as well as their cognitive, affective, and social development in CLIL settings. Many existing studies are descriptive, qualitative, or based on small samples, often lacking control for confounding variables or employing valid and reliable instruments to measure interdisciplinarity and learning outcomes.

Misalignment and Lack of Coherence Across Curriculum, Pedagogy, and Assessment in CLIL: Discrepancies often arise between the intended, implemented, and achieved curriculum in CLIL, particularly concerning interdisciplinarity. The curriculum may lack clear guidelines or support for integrating different disciplines or topics, the pedagogy may fail to facilitate meaningful connections or interactions between content and language, and the assessment methods may not capture the complexity and diversity of interdisciplinary learning.

Conclusion

Chapter one of the study provides a comprehensive overview of CLIL and interdisciplinarity, highlighting their significance in education. It traces the historical context of CLIL and explores its evolution from European multilingual policies to its global dissemination. The foundations of interdisciplinarity are examined through theoretical frameworks, emphasizing its role in fostering collaboration and innovation across disciplines. The intersection of CLIL and interdisciplinarity is explored through studies linking the two concepts and investigating their impact on student learning outcomes.

Chapter Tow

Introduction :

The second chapter of this work delves into insights gathered from interviews with five Biology department teachers at Abbes Laghrour University - Khenchela, aimed at reflecting both student and teacher perspectives on the Role of Interdisciplinarity in CLIL Didactic Materials. The interviews, structured around nine open-ended questions, unveiled various aspects crucial to the effectiveness of CLIL programs. Firstly, the absence of structured processes for regularly measuring satisfaction among students and teachers, alongside the lack of systematic detection of strengths and weaknesses, indicated areas for improvement in program evaluation and enhancement strategies. However, positive collaboration between linguistic and non-linguistic teaching staff showcased the well-integrated approach within the program, emphasizing the benefits of effective coordination for instructional delivery. Despite a supportive environment fostering bilingualism, highlighted within the university's Biology department, challenges such as the absence of integrated bilingual projects and the need for targeted training for CLIL teaching were recognized. The analysis also underscored concerns about inadequate resources and materials for CLIL implementation, despite internal coordination, alongside the absence of formal language proficiency testing for students, suggesting potential oversights in evaluation processes. Overall, the findings underscored both strengths and areas for improvement within the CLIL program, emphasizing the need for structured feedback mechanisms, enhanced coordination, teacher training, and resource provision to optimize program outcomes.

Research Means and Sampling

The means of sampling in this research involved conducting interviews with five Biology department teachers at Abbes Laghrour University - Khenchela, with each interview structured around nine open-ended questions. The aim was to gather insights from both student and teacher perspectives regarding the Role of Interdisciplinarity in CLIL Didactic Materials. Through these interviews, various aspects crucial to the effectiveness of CLIL programs were explored. The sampling method allowed for a comprehensive examination of satisfaction levels, coordination efforts, the culture of bilingualism, and the availability of resources and materials within the CLIL framework. Additionally, the research highlighted the positive collaboration between linguistic and non-linguistic teaching staff, shedding light on the well-integrated approach within the program. However, challenges such as inadequate

resources and materials, alongside the absence of formal language proficiency testing for students, were also identified. Overall, the means of sampling through interviews provided valuable insights into the strengths and areas for improvement within the CLIL program, emphasizing the need for structured feedback mechanisms and enhanced coordination to optimize program outcomes

II. 1 Teachers' interview

A. Description

The interview was done with (5) teachers' of Biology department , Abbes Laghrour University _ Khenchela . it comprises thirteen (13) open-ended-questions .The results of the teachers' interview are brought to mirror the students' and the teachers' themselves insights and consideration related to the Role of Interdisciplinarity in CLIL Didactic Materials

B. Analysis of the interview

The interview evaluates various aspects of a CLIL (Content and Language Integrated Learning) program, seeking feedback from participants.

Area 1: Satisfaction of students and teachers

1. **Is there regular measurement of student and teacher satisfaction with the CLIL program?**

This question aims to understand whether there is a process to regularly assess the satisfaction levels of students and teachers participating in the CLIL programme.The professors unanimously stated that there isn't a defined procedure for consistently gauging the satisfaction levels of students and teachers involved in the CLIL program, as it's seen as a novel endeavor still under examination. Meanwhile, instructors are adhering to guidelines and delivering lectures, while students endeavor to acclimate to the transition from French to English teaching methods.

2. **Are strengths and weaknesses in CLIL systematically detected for improvement?**

This question seeks to ascertain if there's a structured method for pinpointing the strengths and weaknesses of the CLIL program to enable timely enhancements. The consensus among most professors is that there lacks a standardized approach or methodology; instead, it relies on individual faculty members' endeavors to assess students through various tests to discern their strengths and weaknesses.

Area 2 : Coordination

1. **Is there coordination between linguistic and non-linguistic teaching staff?**

This question delves into the existence of coordination and collaboration between linguistic and non-linguistic teachers . All respondents affirmed the presence of such collaboration. Coordination is evident between instructors tasked with employing the interdisciplinary approach and those employing traditional methods, facilitating the identification of necessary adjustments and monitoring the progression of the process.

2. **Is there satisfaction with the level of CLIL coordination?**

The second question seeks to establish the satisfaction level of program teachers engaged in the CLIL program regarding the degree of coordination and collaboration among them. Teaching within their specialization alongside the CLIL program appears to facilitate their instruction effortlessly.

Area 3 :Culture of Bilingualism at School

1. **Is there an environment of bilingualism/plurilingualism at University ?**

The first question aims to understand whether the university fosters an environment in which multiple languages are appreciated and encouraged. All professors answered in the affirmative, as they confirmed that the biology environment is a medium in which multilingualism is applicable. On the contrary, this encouraged professors to use the English language because most of the sources and the mother tongue of these sources is English, which is an easy and smooth language for learning science, and therefore the environment is very encouraging for interdisciplinarity

2. **Are there integrated bilingual projects/units and programmed activities to promote CLIL?**

This question assesses whether there are specific project units or activities within the CLIL program to promote multilingualism and support integration between language learning and content. The answer of most professors was that there are no such projects currently and there are no units or activities coordinated between departments. Each department is independent.

3. **Is there involvement in international projects and exchanges?**

This question was developed to verify whether the CLIL program participates in international collaborations, projects, or student exchanges to enhance the learning experience through multilingualism and integration between language learning and content. The result was positive on the part of the professors, as they acknowledged that all of their participation in international projects and exchanges were In the English language, the specialization administration called for this to promote multilingualism among professors

4. **Do teachers have specific pedagogical knowledge (CLIL) facilitating CLIL teaching?**

The fourth question evaluates whether the teachers have received training or have previous educational knowledge specialized in teaching effectively in the context of CLIL and the answer is completely negative by all professors. To teach teachers to the English language in particular, but training about educational knowledge in particular or how to conduct the lesson. There is still no special training for this knowledge

5. **Are appropriate resources used for CLIL learning, and are there adequate curricular materials?**

This question aims to understand whether the CLIL program uses appropriate resources and curricular materials to support effective learning and teaching. All the responses were negative, citing that they did not receive any resources, despite the existence of an educational platform affiliated with the Ministry of Higher Education specifically for the CLIL program. They face difficulty in using it, so they provide their own resources for teaching on a personal and individual basis.

6. **Is the CLIL program adapted to the university context, and is there coordination in planning?**

This question evaluates whether the CLIL program is designed to fit the academic university environment and whether there is effective coordination in the planning process. Through the responses of the professors, it became clear that internally, within the

department, there is coordination. However, externally, between colleges or between colleges of other universities in the same field, there is no real coordination. They described the process as an experiment without a solid plan.

7. **Do students reach objectives in the foreign language and non-linguistic areas?**

This question aims to understand whether students are achieving the specified objectives for both language learning and content knowledge within the CLIL program. Through this question, all the teachers responded positively that the students' results did not show significant differences or deteriorations in their condition; on the contrary, the results were almost convergent. This means that the language change did not affect their results, but rather revealed other groups inclined towards the English language, helping them understand the material and improve their level more than before.

8. **Do students obtain certificates of B1 or higher?**

This question assesses whether students achieve language proficiency levels of B1 or higher as part of their participation in the program. All the teachers confirmed that students were not tested to determine their proficiency level in English. However, on the other hand, the teachers' proficiency levels were assessed, and based on that, they were divided and directed to a language intensification center to improve their proficiency to the required level so they can teach. Meanwhile, the students' proficiency levels in English were not taken into consideration, which is considered a flaw in the process.

9. **Is there satisfaction with the CLIL program, and is the department well-regarded by the community?**

This question assesses the overall satisfaction levels with the CLIL program among participants and the broader community, as well as evaluates the department's reputation within the community. The teachers initially expressed some reluctance towards it due to language concerns, as they were not accustomed to using English in teaching; instead, they were accustomed to using French language. However, after the process unfolded and they saw the results, as well as the coordination among linguistic and non-linguistic teachers, they found that the process proceeded very smoothly. On the contrary, many of them became enthusiastic about participating in this process. Regarding the teachers who were involved in

the process, they expressed their admiration and enthusiasm for participating in it. They affirmed that the ministry should have taken this step long ago, as they all agreed that English was easier for conveying and receiving information, especially in the fields of biology and science.

C. Results of teachers' Interview

The analysis of the interview findings regarding the CLIL program reveals a significant gap in systematic evaluation and improvement strategies. While seeking feedback from participants, particularly students and teachers, the interview uncovers deficiencies in two critical areas. Firstly, there appears to be a lack of regular measurement of satisfaction levels among students and teachers involved in the program. This absence of a defined procedure for gauging satisfaction suggests a need for more structured feedback mechanisms to ensure continuous improvement. Secondly, the detection of strengths and weaknesses in the CLIL program for enhancement purposes is found to be lacking a systematic approach. Instead, it relies heavily on individual efforts by faculty members to identify areas for improvement, indicating a need for a more organized and standardized method for assessing program effectiveness. In conclusion, the findings underscore the importance of implementing robust feedback mechanisms and structured evaluation processes to enhance the overall effectiveness of the CLIL program.

The interview findings regarding the coordination aspect of the CLIL program shed light on the positive collaboration between linguistic and non-linguistic teaching staff in the department of Biology , indicating a well-integrated approach within the program. All respondents unanimously confirmed the presence of coordination between instructors from different disciplines, which is crucial for the successful implementation of the interdisciplinary approach. This coordination not only facilitates the identification of necessary adjustments but also allows for effective monitoring of the program's progression. Moreover, teachers engaged in the CLIL program expressed satisfaction with the level of coordination, noting that teaching within their specialization alongside CLIL enhances their instructional delivery seamlessly. Overall, these findings underscore the importance of effective collaboration and coordination among teaching staff in maximizing the benefits of the CLIL program and ensuring its continued success.

The evaluation of the CLIL program highlighted several key findings. Professors acknowledged a supportive environment for bilingualism at the university, especially in the biology department where English is prevalent and facilitates understanding of scientific concepts. However, there is a lack of integrated bilingual projects or activities to promote CLIL, indicating room for improvement. While professors engage in international projects predominantly in English, they lack specific pedagogical knowledge for CLIL teaching, underscoring the need for targeted training. Challenges persist due to inadequate resources and materials for CLIL implementation, despite internal coordination. Participants expressed satisfaction with program outcomes, noting positive student achievements in language and content areas, but raised concerns about the absence of formal language proficiency testing for students, indicating a potential oversight in evaluation. Overall, while enthusiasm for CLIL exists and its benefits are recognized, there are clear areas for improvement, including enhanced coordination, teacher training, and resource provision.

As conclusion for The findings from the analysis of the CLIL program interviews reveal both strengths and areas for improvement. Firstly, there is a notable lack of systematic evaluation and improvement strategies, particularly in gauging satisfaction levels among participants and identifying program strengths and weaknesses. This underscores the need for structured feedback mechanisms and standardized evaluation processes to enhance program effectiveness. Conversely, the interviews highlight positive collaboration and coordination among teaching staff in the Biology department, facilitating the successful implementation of CLIL. Teachers express satisfaction with this coordination, emphasizing its benefits for instructional delivery. However, challenges persist, including the absence of integrated bilingual projects and the need for targeted training in CLIL teaching. While participants acknowledge the benefits of CLIL, such as facilitating understanding of scientific concepts, there is a clear call for enhanced coordination, teacher training, and resource provision to optimize program outcomes.

II. 2. Analysis of student Questionnaire

A. Description

The questionnaire was administered to a Master's student in the Biology department at Abbes Laghrour University in Khenchela. It commenced with an introduction aimed at informing the student about the scope and aim of the present research, namely to investigate the Role of Interdisciplinarity in CLIL Didactic Materials. The questionnaire was divided into four sections: Knowledge of Interdisciplinarity, Critical Reflection, Collaboration, and Communication. It contained 21 closed-ended questions designed to assess the student's agreement, disagreement, or uncertainty regarding the topic

B. Analysis of the questionnaire sf students':

The opinion direction for the Likert scale	
Opinion direction	**Average**
I disagree	**From 1 to 1.66**
I dont know	**From 1.67 to 2.33**
I agree	**From 2.34 to 3**

Table N (01): The opinion direction for the Likert scale

- **Section 01 : Knowledge of Interdisciplinarity**

Data regarding Knowledge of Interdisciplinarity was collected through statements in the questionnaire distributed to the study sample. The analysis results for these statements are as follows: **Table (02):** Illustrates the percentages, mean, standard deviation, and result for each statement of the Knowledge of Interdisciplinarity axis. Sample: Master One Student From Biology Department .

Arrangement	Total	Standard deviation	Mean	Result			I disagree (1)	I dont know (2)	I Agree (03)	Statement Code and Number Statment number
							Repetition	Repetition	Repetition	
							%	%	%	
02	**Agree**	**.632**	**2.59**	40			**03**	**10**	**27**	**A1**
				100%			**7.5**	**25**	**67.5**	
7	**dont know**	**.764**	**2.08**	40			**10**	**17**	**13**	**A2**
				100%			**25**	**42.5**	**32.5**	
6	**dont know**	**.862**	**2.23**	40			11	09	20	**A3**
				100%			27.5	22.5	50	
5	**Agree**	**.810**	**2.40**	40			8	8	24	**A4**
				100%			20	20	60	
8	**Disagree**	**.838**	**1.63**	40			24	7	9	**A5**
				100%			60	17.5	22.5	
9	**Disagree**	**.784**	**1.53**	40			26	7	7	**A6**
				100%			65	17.5	15.5	
4	**Agree**	**.844**	**2.43**	40			9	5	26	**A7**
				100%			22.5	12.5	65	
3	**Agree**	**.816**	**2.50**	40			8	4	28	**A8**
				100%			20	10	70	
01	**Agree**	**.632**	**2.60**	**40**			3	10	27	**A9**
				100%			7.5	25	67.5	
	dont know	**0.574**	**2.219**	**(Knowledge of interdisciplinarity)Total axis expressions.**						

Source: Compiled by the researcher based on SPSS program outputs.

The critical T-value at a significance level of 0.05 and degrees of freedom 39 is 029.2.

Table (01) presents the study participants' opinions on the first axis expressions (Knowledge of Interdisciplinarity) from the questionnaire, ranked in descending order according to the mean value for each expression, as follows:

1. Expression number (09) ranked first, which states: "Generally speaking, I believe that the benefits of interdisciplinary research outweigh the inconveniences of such work." It evaluates the respondent's stance towards interdisciplinary research, weighing its benefits against potential challenges. It achieved an average of 2.60 and a standard deviation of 0.6320, indicating agreement among the sample that the individual's perspective on the value and importance of interdisciplinary collaboration in academic endeavors is positive.

2. Expression number (01) ranked second, which states: "Is Interdisiplinarity in CLIL reflected in activities and involved subjects." This question assesses whether CLIL activities and subjects incorporate interdisciplinary approaches. The aim is to understand the extent to which CLIL materials integrate multiple disciplines and promote interdisciplinary learning. It achieved an average of 2.59 and a standard deviation of 0.6320, indicating that students' in the sample agree on the integration of CLIL materials with multiple disciplines to enhance interdisciplinary learning.

3. Expression number (08) ranked third, stating: "In my own research, I typically use multiple research methods drawn from more than one discipline rather than rely exclusively on a single disciplinary approach." This question evaluates the respondent's research methodology, specifically their propensity for interdisciplinary approaches. The aim is to understand the extent to which individuals incorporate diverse research methods and perspectives into their scholarly work. It achieved an average of 2.50 and a standard deviation of 0.816, indicating that students in the sample agree on the importance of incorporating diverse research methods and perspectives into their scholarly work.

4. Expression number (07) ranked fourth, stating: "I see connections between ideas in natural sciences and social sciences." It assesses the respondent's ability to recognize and articulate connections between concepts from disparate academic domains. The aim is to gauge the individual's interdisciplinary thinking skills, particularly in bridging the natural and social sciences. It achieved an average of 2.43 and a standard deviation of 0.844, indicating

agreement among students in the sample on the importance of possessing interdisciplinary thinking skills.

5. Expression number (04) ranked fifth, stating: "While solving an academic problem, I am good at figuring out which information from outside my field of study I can use." It explores whether individuals actively seek input from experts in other disciplines when addressing problems within their own field. The aim is to assess the respondent's tendency to engage with interdisciplinary perspectives and expertise. It achieved an average of 2.40 and a standard deviation of 0.810, indicating agreement among the sample that individuals tend to respond to interdisciplinary perspectives and expertise.

6. Expression number (03) ranked sixth, stating: "I often think about how different academic fields approach the same problem in different ways." This question explores the individual's inclination towards considering diverse perspectives from various academic fields when addressing a problem. The aim is to gauge the respondent's awareness and appreciation of interdisciplinary approaches to problem-solving. It achieved an average of 2.23 and a standard deviation of 0.862, indicating that participants in the sample lack awareness and appreciation of interdisciplinary approaches to problem-solving.

7. Expression number (02) ranked seventh, stating: "There is appropriate resources used for CLIL learning, and adequate curricular materials based on interdisciplinarity." It evaluates whether the resources and curricular materials used in CLIL adequately support interdisciplinary learning. The aim is to assess the availability and effectiveness of resources that foster interdisciplinary learning in CLIL contexts. It achieved an average of 2.08 and a standard deviation of 0.764, indicating that participants in the sample are unsure about the availability and effectiveness of resources that foster interdisciplinary learning in CLIL contexts.

8. Expression number (05) ranked eighth, stating: "I sometimes take ideas from outside my field of study while working on an academic problem." It explores whether individuals incorporate ideas from other disciplines into their problem-solving process. The aim is to understand the respondent's openness to interdisciplinary ideas and approaches in academic pursuits. It achieved an average of 1.63 and a standard deviation of 0.838, indicating disagreement among the sample regarding openness to interdisciplinary ideas and approaches in academic pursuits.

9. Expression number (06) ranked last (ninth), stating: "I often read about topics outside of my own field of study." This question examines the respondent's propensity to explore subjects beyond their primary area of study. The aim is to determine the individual's breadth of intellectual curiosity and interdisciplinary engagement. It achieved an average of 1.53 and a standard deviation of 0.784, indicating that participants in the sample confirm a lack of intellectual curiosity and interdisciplinary engagement.

In essence , students in the sample tend to lack sufficient knowledge about statements from the first axis, as indicated by the average mean of 2.219 and a standard deviation of 0.574, which is inconclusive for the first axis as a whole. This suggests that the first axis overall is negative, meaning that students in the sample lack wide awareness of interdisciplinary diversity in the CLIL field.

Participants generally show awareness of interdisciplinary approaches, with most agreeing that CLIL activities reflect interdisciplinarity and that they often think about different academic fields' approaches to the same problem. However, there are mixed responses regarding the use of appropriate resources and taking ideas from outside their field of study, indicating some uncertainty or variability in practice.

- **Section tow : Critical Reflection**

Table (03): Illustrates the percentages, mean, standard deviation, and result for each statement of the Critical Reflection axis. Sample: Master One Student From Biology Department .

Arrangement	Total	Standard deviation	Mean	Result			I disagree (1)	I dont know (2)	I Agree (03)	Statement Code and Number Statment number
							Repetition	Repetition	Repetition	
							%	%	%	
1	Agree	0.705	2.63	40			5	5	30	B1
				100%			12.5	15.5	75	
3	Agree	0.816	2.48	40			8	5	27	B2
				100%			20	12.5	67.5	
2	Agree	0.712	2.58	40			5	7	28	B3
				100%			12.5	17.5	70	
	Agree	0.72	2.55	(Critical Reflection)Total axis expressions.						

Source: Compiled by the researcher based on the outputs of the SPSS program.

The critical T-value at a significance level of 0.05 with 39 degrees of freedom is 029.2.

1. Expression number 10, which states: "I like to think over what I have been doing and consider alternative ways of doing it," ranked first. This question assesses the respondent's inclination towards reflection and innovation, crucial for developing interdisciplinary CLIL materials that incorporate diverse perspectives and methodologies. The aim is to understand the respondent's openness to exploring alternative approaches, which is essential for adapting CLIL materials to cater to diverse student needs and learning styles. It achieved an average of 2.63 and a standard deviation of 0.7050, indicating agreement among the sample that openness to exploring alternative methods is important for adapting CLIL materials.

2. Expression number 12, which states: "I can easily summarize a complex scientific theory," ranked second. The aim of this question is to measure participants' proficiency in summarizing complex scientific concepts. It achieved an average of 2.58 and a standard deviation of 0.7120, indicating that most participants feel capable of summarizing complex scientific theories easily.

3. Expression number 11, which states: "I am able to explain knowledge and ideas from my own field of study effectively to non-experts," ranked third. This question evaluates the respondent's ability to communicate complex concepts in their field to individuals with varying levels of expertise, essential for making CLIL materials accessible and comprehensible to all students, including non-experts. The aim is to assess the respondent's capacity to bridge the gap between specialized content and language proficiency, vital for effective CLIL instruction. It achieved an average of 2.48 and a standard deviation of 0.816, indicating that a significant number of participants feel confident in explaining knowledge to non-experts.

On the whole , participants show agreement with statements from the second axis, as evidenced by the average mean of 2.55 and a standard deviation of 0.72, suggesting a positive attitude towards critical reflection and the ability to effectively communicate complex concepts to non-experts.

Participants demonstrate a strong inclination towards critical reflection, as evidenced by their agreement with statements about considering alternative ways of doing things and effectively explaining knowledge to non-experts. This suggests a capacity for self-awareness and adaptability in learning and teaching practices.

- **Section three : Collaboration**

Data were collected on Collaboration 06 phrases in the questionnaire that was distributed to members of the study sample, and the results of the analysis of these paragraphs appeared as follows:

Table N.(04): Shows the percentages, arithmetic mean, standard deviation, result and significance level for each of the statements of the third axis: (Collaboration)

Arrangement	Total			Standard deviation	Mean	Result			I disagree (1)	I dont know (2)	I Agree (03)	Statement Code and Number Statment number
									Repetition	Repetition	Repetition	
									%	%	%	
05	I dont know			0.640	1.73	40			15	21	4	C1
						100%			37.5	52.5	10	
03	I dont know			0.791	2.30	40			8	12	20	C2
						100%			20	30	50	
06	Disagree			0.572	1.33	40			29	9	2	C3
						100%			72.5	22.5	5	
04	I dont know			0.883	2.20	40			12	8	20	C4
						100%			30	20	50	
02	Agree			0.784	2.48	40			7	7	26	C5
						100%			17.5	17.5	65	
01	Agree			0.564	2.70	40			2	8	30	C6
						100%			5	20	75	
	I dont know			0.62	2.12	Collaboration) Total axis expressions						

Source: Compiled by the researcher based on the outputs of the SPSS program.

The critical T-value at a significance level of 0.05 with 39 degrees of freedom is 029.2.

1. Expression number (18) ranked first, stating: "I am optimistic that interdisciplinary collaboration among ID-SURE collaborators will lead to valuable scientific outcomes that would not have occurred without that collaboration." This question aims to gauge the respondent's optimism regarding the potential benefits of interdisciplinary collaboration, emphasizing its role in generating innovative and impactful outcomes in CLIL initiatives. The aim is to assess the respondent's perception of the value of interdisciplinary collaboration, crucial for fostering a positive outlook and motivation towards collaborative efforts in developing CLIL materials. It achieved an average of 2.70 and a

standard deviation of 0.564, indicating that most participants are optimistic about the outcomes of interdisciplinary collaboration among ID-SURE collaborators.

2. Expression number (17) ranked second, stating: "I would describe myself as someone who strongly values interdisciplinary collaboration." This question assesses the respondent's attitude towards interdisciplinary teamwork, highlighting the importance of embracing collaboration across disciplines in the context of CLIL to foster holistic learning experiences. The aim is to gauge the respondent's recognition of the importance of interdisciplinary collaboration, crucial for creating effective CLIL materials that integrate language and content instruction seamlessly. It achieved an average of 2.48 and a standard deviation of 0.784, indicating that many participants describe themselves as individuals who strongly value interdisciplinary collaboration.

3. Expression number (14) ranked third, stating: "I can work well in teams where knowledge and ideas from multiple fields of study must be applied." This question evaluates the respondent's proficiency in integrating insights from various disciplines, fundamental for developing comprehensive CLIL materials that encompass diverse perspectives and subject areas. The aim is to assess the respondent's ability to synthesize knowledge across disciplines, crucial for creating interdisciplinary CLIL materials that foster holistic understanding and critical thinking among students. It achieved an average of 2.30 and a standard deviation of 0.791, indicating that many participants feel competent in working effectively in teams where knowledge and ideas from multiple fields of study are applied.

4. Expression number (16) ranked fourth, stating: "I am good at working in teams that include students from outside my own field of study." This question assesses the respondent's adaptability and collaboration skills in diverse interdisciplinary teams, essential for creating inclusive CLIL materials that cater to the needs of students from various disciplinary backgrounds. The aim is to evaluate the respondent's ability to collaborate effectively across disciplinary boundaries, vital for developing CLIL materials that promote interdisciplinary understanding and cooperation among students. It achieved an average of 2.20 and a standard deviation of 0.883, indicating that many participants feel skilled in working within teams that include students from outside their own field of study.

5. Expression number (13) ranked fifth, stating: "Is there coordination between linguistic and non-linguistic teaching staff." This question addresses the collaboration

between language instructors and subject matter experts, emphasizing the need for alignment and cooperation in developing CLIL materials that integrate language and content instruction seamlessly. The aim is to assess the level of collaboration between educators from different disciplines, crucial for ensuring the effectiveness of CLIL materials in facilitating language and content learning simultaneously. It achieved an average of 1.73 and a standard deviation of 0.640, indicating a lack of coordination between linguistic and non-linguistic teaching staff according to the majority of participants.

6. Expression number (15) ranked sixth, stating: "There is an integrated bilingual projects/units and programmed activities to promote CLIL." This question addresses the presence of structured initiatives aimed at promoting CLIL, emphasizing the importance of intentional efforts to develop bilingual materials and activities that facilitate language and content learning concurrently. The aim is to determine the extent of support for CLIL implementation, crucial for creating an immersive learning environment that promotes language acquisition and content mastery simultaneously. It achieved an average of 1.33 and a standard deviation of 0.572, indicating that most respondents point to the absence of integrated bilingual projects/units and programmed activities to promote CLIL.

Overall, students in the sample tend to agree with statements from the third axis, as indicated by the average mean of 2.12 and a standard deviation of 0.62, which is inconclusive for the third axis as a whole. This suggests that the third axis overall is not positive, indicating that students in the sample are not entirely satisfied.

While participants value interdisciplinary collaboration and express optimism about its outcomes, there are discrepancies in actual collaborative practices. Coordination between linguistic and non-linguistic teaching staff appears lacking, and the integration of bilingual projects or activities for CLIL promotion seems insufficient. However, there is a willingness to work in teams and a recognition of the value of interdisciplinary collaboration.

- **Section four : Communication .**

Table N.(05): Shows the percentages, arithmetic mean, standard deviation, result and significance level for each of the statements of the third axis: (Communication)

Arrangement	Total	Standard deviation	Mean	Result	I dont know (1)	I dont know (2)	I Agree (03)	Statement Code and Number Statment number
					Repetition	Repetition	Repetition	
					%	%	%	
01	I agree	0.784	2.53	40	7	5	28	D1
				100%	17.5	12.5	70	
03	I disagree	0.675	1.42	40	27	9	4	D2
				100%	67.5	22.5	10	
02	I agree	0.778	2.40	40	7	10	23	D3
				100%	17.5	25	57.5	
	I agree	0.64	2.11	(Communication)Total axis expressions.				

Source: Compiled by the researcher based on the outputs of the SPSS program.

The critical T-value at a significance level of 0.05 with 39 degrees of freedom is 029.2.

1. Expression number (19) ranked first, stating: "I can proficiently communicate complex concepts and information from my area of expertise in a way that's easily understandable for those who aren't familiar with it." This question gauges the respondent's confidence in communicating scientific concepts to students from different disciplinary backgrounds, highlighting the importance of clear and effective communication in interdisciplinary CLIL contexts. The aim is to determine the respondent's ability to convey complex ideas across disciplinary boundaries, essential for fostering interdisciplinary understanding and collaboration among students. It achieved an average of 2.53 and a standard deviation of 0.784, indicating that many participants feel competent in delivering complex concepts and information in a comprehensible manner.

2. Expression number (21) ranked second, stating: "I believe I can effectively convey scientific theories to students who aren't in my area of expertise." Similar to previous questions, this item aims to assess the respondent's confidence in communicating scientific concepts to audiences beyond their disciplinary expertise, highlighting the communicative skills necessary for successful CLIL implementation. The aim is to determine

the respondent's ability to convey complex ideas across disciplinary boundaries, essential for fostering interdisciplinary understanding and collaboration among students in CLIL settings. It achieved an average of 2.40 and a standard deviation of 0.778, with some participants disagreeing, but the majority believing they can effectively convey scientific theories to students outside their expertise.

3. Expression number (20) ranked third, stating: "I think that I can communicate effectively about scientific theories with students outside my field of study." This question aims to evaluate participants' confidence in communicating scientific theories to students from different academic backgrounds. It achieved an average of 1.42 and a standard deviation of 0.675, indicating a high level of confidence among participants in effectively communicating about scientific theories with students from diverse academic backgrounds.

As result , participants generally agree with statements from the fourth axis, as indicated by the average mean of 2.11 and a standard deviation of 0.64, which is conclusive for the fourth axis as a whole. This suggests that the fourth axis overall is positive, with students in the sample agreeing with statements from the fourth axis.

Participants generally feel proficient in communicating complex concepts to non-experts and believe they can effectively convey scientific theories to students outside their field. However, there is some uncertainty about communicating scientific theories with students from different fields, indicating a potential area for improvement in cross-disciplinary communication skills.

D. Results of Students' questionnaire

The findings from the questionnaire on the Role of Interdisciplinarity in CLIL Didactic Materials provide valuable insights into students' perspectives and attitudes towards interdisciplinary collaboration, critical reflection, collaboration, and communication within CLIL contexts. The study participants generally display a positive attitude towards interdisciplinary collaboration, recognizing its importance in academic endeavors. They acknowledge the benefits of interdisciplinary research, with a majority agreeing that the benefits outweigh the inconveniences. Moreover, there is consensus among students that CLIL activities reflect interdisciplinarity, indicating a positive perception of the integration of multiple disciplines in CLIL materials.

Regarding critical reflection, participants demonstrate openness to considering alternative approaches and show proficiency in summarizing complex scientific theories. They also express confidence in explaining knowledge and ideas from their field of study effectively to non-experts, highlighting their capacity for effective communication within interdisciplinary settings.

However, there are areas for improvement identified in collaboration and communication aspects. While students express optimism about interdisciplinary collaboration outcomes, there are discrepancies in actual collaborative practices, particularly in coordination between linguistic and non-linguistic teaching staff. Additionally, the integration of bilingual projects or activities for CLIL promotion appears insufficient, reflecting a gap in support for CLIL implementation.

In terms of communication, participants generally feel proficient in communicating complex concepts to non-experts and believe they can effectively convey scientific theories to students outside their field. However, there is some uncertainty about communicating scientific theories with students from different fields, suggesting a potential area for improvement in cross-disciplinary communication skills.

As Conclusion , the findings underscore the importance of fostering interdisciplinary collaboration, critical reflection, effective collaboration, and communication skills in CLIL contexts. Addressing the identified gaps and promoting interdisciplinary understanding and cooperation among students are essential for developing effective CLIL materials that facilitate holistic learning experiences and cater to diverse student needs.

Table N (06): Illustrates the coding of study variables

Sample : Master One Student From Biology Department .

(A for expressions of the first axis, B for expressions of the second axis, C for expressions of the third axis, D for expressions of the fourth axis)

Expression	Symbol
Is Interdisiplinarity in CLIL reflected in activities and involved subjects	**A1**
There is appropriate resources used for CLIL learning, and adequate curricular materials based on interdisiplinarity	**A2**
I often think about how different academic fields approach the same problem in different ways	**A3**
While solving an academic problem, I am good at figuring out which information from outside my own field of study I can use.	**A4**
I sometimes take ideas from outside my own field of study while working on an academic problem.	**A5**
I often read about topics outside of my own field of study.	**A6**
I see connections between ideas in natural sciences and social sciences	**A7**
In my own research, I typically use multiple research methods drawn from more than one discipline rather than rely exclusively on a single disciplinary approach	**A8**
Generally speaking, I believe that the benefits of interdisciplinary research outweigh the inconveniences of such work.	**A9**
I like to think over what I have been doing and consider alternative ways of doing it.	**B1**
I am able to explain knowledge and ideas from my own field of study effectively to non-experts	**B2**
I can easily summarise a complex scientific theory.	**B3**
Is there coordination between linguistic and non-linguistic teaching staff	**C1**
I can work well in teams where knowledge and ideas from multiple fields of study must be applied	**C2**
There is an integrated bilingual projects/units and programmed activities to promote CLIL	**C3**

I am good at working in teams that include students from outside my own field of study.	**C4**
I would describe myself as someone who strongly values interdisciplinary collaboration	**C5**
I am optimistic that interdisciplinary collaboration among ID-SURE collaborators will lead to valuable scientific outcomes that would not have occurred without that collaboration.	**C6**
I can proficiently communicate complex concepts and information from my area of expertise in a way that's easily understandable for those who aren't familiar with it.	**D1**
I think that I can communicate effectively about scientific theories with students outside my field of study.	**D2**
I believe I can effectively convey scientific theories to students who aren't in my area of expertise.	**D3**

II. 3. Discussion for all finding

The integration of interdisciplinarity within Content and Language Integrated Learning (CLIL) didactic materials is explored in relation to its impact on students' comprehension and critical thinking skills. Findings from the study indicate positive collaboration and coordination among teaching staff, particularly in disciplines such as Biology, which not only enhances instructional delivery but also fosters a comprehensive understanding of subjects among students. This suggests that the incorporation of interdisciplinarity positively influences the effectiveness of CLIL didactic materials in improving students' comprehension and critical thinking abilities. Moreover, existing research, including studies by Abutalebi & Clahsen (2018), Hemmi & Banegas (2021), and Gabillon (2020), delves into the theoretical and practical aspects of CLIL, highlighting its interdisciplinary nature. Additionally, insights from research on challenges and barriers to interdisciplinary teaching and learning underscore the complexities involved in implementing interdisciplinary approaches (Challenges And Barriers To Interdisciplinary Teaching And Learning, 2012).

The extent of interdisciplinarity in current CLIL didactic materials is perceived positively by study participants, who generally view CLIL activities as reflecting integration across multiple disciplines, suggesting a significant presence of interdisciplinarity. Theoretical frameworks of CLIL, such as its cognitive-epistemological foundation, offer a lens through which to analyze this interdisciplinary nature (Abutalebi & Clahsen, 2018; Alberich i Carramiñana & Florit Ballester, 2006). Drawing from these frameworks, the analysis of current CLIL didactic materials can gauge the depth of interdisciplinary integration. Insights gleaned from prior studies serve to further inform this evaluation, aiding in the assessment of the materials' adherence to interdisciplinary principles.

Interdisciplinarity within CLIL contexts significantly impacts students' comprehension levels, particularly evidenced by positive collaboration and coordination among teaching staff, notably in departments like Biology, which enhance instructional delivery and foster a comprehensive understanding of subjects among students. This suggests a positive correlation between interdisciplinarity and heightened comprehension within CLIL frameworks. Research in the field, exemplified by studies such as those conducted by Gimeno et al. (2010) and Nikula et al. (2016), offers empirical evidence and theoretical frameworks supporting the influence of interdisciplinarity on comprehension in CLIL settings. Leveraging insights from prior studies, further investigation into the relationship between interdisciplinary approaches

and comprehension levels in CLIL environments is warranted. Additionally, conducting comparative analyses between CLIL and traditional teaching methodologies may yield valuable insights into the efficacy of interdisciplinary integration in enhancing comprehension among students.

The impact of interdisciplinarity on the cultivation of critical thinking skills among students utilizing CLIL materials is evident through their demonstrated openness to considering alternative approaches and proficiency in summarizing complex scientific theories. Additionally, their expressed confidence in effectively communicating knowledge to non-experts underscores their adeptness within interdisciplinary settings, suggesting a positive correlation between interdisciplinarity and the development of critical thinking skills in CLIL environments. Previous studies, such as those by Mardi et al. (2021) and Wade & Stone (2010), have explored the role of educational models, including CLIL, in fostering critical thinking skills. By examining these research findings, further insights can be gleaned into how interdisciplinary integration within CLIL materials contributes uniquely to the enhancement of critical thinking abilities among students. Comparative analyses with non-CLIL contexts may offer valuable perspectives on the distinct impact of interdisciplinary approaches in this regard.

The findings from both the students' questionnaire and the teachers' interviews offer critical insights into the multifaceted nature of interdisciplinary collaboration within the CLIL framework. The questionnaire reveals students' positive disposition towards interdisciplinary collaboration, evident in their recognition of the benefits of interdisciplinary research and acknowledgment of CLIL activities as reflective of interdisciplinarity. This positive attitude fosters an environment conducive to engaging with diverse perspectives, enriching learning experiences. Additionally, the questionnaire underscores students' inclination towards critical reflection and effective communication, indicating a strong grasp of subject matter and readiness to explore different methodologies. However, areas for improvement in collaboration and communication suggest a need for targeted interventions. Meanwhile, the teachers' interviews highlight both strengths and challenges within the CLIL program, emphasizing positive collaboration among teaching staff, particularly in departments like Biology, and the importance of systematic evaluation and improvement strategies. Challenges such as the absence of integrated bilingual projects and the need for specialized training underscore complexities in effective interdisciplinary implementation, suggesting the

necessity for rigorous assessment practices to enhance program effectiveness and ensure continuous improvement.

In conclusion, both the students' questionnaire and the teachers' interviews emphasize the significance of fostering interdisciplinary collaboration, critical reflection, effective communication, and systematic evaluation within CLIL contexts. Addressing identified challenges and leveraging existing strengths are essential for creating a conducive learning environment where students can thrive and develop interdisciplinary competencies. By nurturing a culture of collaboration, innovation, and continuous improvement, CLIL programs can realize their full potential in preparing students for the complexities of the modern world.

III. General Recommendations:

Based on the provided text, here are some general recommendations and specific recommendations for teachers and students:

- **Foster Interdisciplinary Collaboration**: Encourage collaboration between different disciplines to enrich learning experiences and promote holistic understanding.
- **Implement Structured Evaluation Processes**: Establish systematic feedback mechanisms to measure satisfaction levels among both students and teachers, and identify program strengths and weaknesses for continuous improvement.
- **Promote Critical Reflection**: Encourage students to explore alternative approaches and viewpoints, fostering innovation and problem-solving skills.
- **Enhance Communication Skills**: Provide opportunities for students to effectively communicate complex concepts to both experts and non-experts, promoting clarity and understanding across disciplines.
- **Provide Targeted Training**: Offer specialized training for educators in CLIL teaching methodologies to improve instructional delivery and support interdisciplinary integration.
- **Optimize Resources and Materials**: Allocate adequate resources and materials for CLIL implementation to support diverse learning needs and enhance program outcomes.

Recommendations for Teachers:

- **Leverage Collaboration**: Continue to collaborate with colleagues from different disciplines to integrate diverse perspectives into teaching practices.
- **Embrace Training Opportunities**: Engage in targeted training programs to enhance proficiency in CLIL teaching methodologies and promote effective interdisciplinary integration.
- **Facilitate Communication**: Create opportunities for students to communicate complex concepts effectively, both within and across disciplines, to enhance interdisciplinary understanding.
- **Advocate for Resource Allocation**: Advocate for sufficient resources and materials to support CLIL implementation, ensuring optimal learning experiences for students.
- **Implement Evaluation Strategies**: Incorporate structured evaluation processes to gather feedback from students and colleagues, enabling continuous improvement in CLIL program effectiveness.

Recommendations for Students:

Embrace Interdisciplinary Collaboration: Actively engage in interdisciplinary collaboration to leverage diverse perspectives and enhance learning outcomes.

Cultivate Critical Thinking Skills : Foster a mindset of critical reflection and openness to alternative approaches to problem-solving, promoting innovation and creativity.

Enhance Communication Abilities: Develop effective communication skills to articulate complex concepts clearly to both experts and non-experts, facilitating interdisciplinary dialogue.

Seek Learning Opportunities : Take advantage of opportunities for interdisciplinary learning and exploration to broaden knowledge and understanding across disciplines.

Provide Feedback : Offer constructive feedback on CLIL program experiences to contribute to ongoing improvements in teaching and learning methodologies.

By implementing these recommendations, both educators and students can contribute to the success of CLIL programs, fostering interdisciplinary collaboration, critical reflection, effective communication, and continuous improvement in learning outcomes

IV. Limitations:

During the conduct of this study, several limitations were encountered.

- Due to the limited number of professors in the Biology department who were committed to teaching in English for specific branches and subjects, I was unable to access a large pool of professors.I had to select some professors from the first and third years.
- Regarding the questionnaire, I distributed 50 copies but only received 40 copies in return.

Conclution

Chapter two presents the findings from interviews with Biology department teachers and a questionnaire administered to Master One students at Abbes Laghrour University. The interviews reveal strengths and areas for improvement within the CLIL program, including positive collaboration among teaching staff and challenges such as the absence of integrated bilingual projects and the need for specialized training in CLIL teaching. The questionnaire highlights students' positive attitudes towards interdisciplinary collaboration and critical reflection but identifies areas for improvement in collaboration and communication.

General conclusion

The research study titled "The Role of Interdisciplinarity in CLIL Didactic Materials" examines the impact of integrating interdisciplinary elements on the effectiveness of CLIL (Content and Language Integrated Learning) didactic materials in enhancing students' comprehension and critical thinking skills.

The study addresses three specific research questions concerning the extent and impact of interdisciplinarity in CLIL didactic materials. Firstly, it investigates the incorporation of interdisciplinarity in current CLIL materials, particularly in Algerian universities like Khenchela University, aiming to offer authentic learning experiences and promote higher-order thinking skills.

Secondly, it explores how interdisciplinarity affects students' comprehension levels, revealing that it enhances understanding by transcending traditional boundaries and offering diverse perspectives.

Lastly, the study examines the impact of interdisciplinarity on the cultivation of critical thinking skills among students, highlighting the positive influence but also identifying areas for improvement in collaborative practices and communication skills across disciplines.

Broadly, the findings underscore the importance of fostering interdisciplinary collaboration, critical reflection, effective collaboration, and communication skills in CLIL contexts to cater to diverse student needs and facilitate holistic learning experiences. The research hypothesis posits that the incorporation of interdisciplinary elements in the design of CLIL didactic materials will positively correlate with improved student learning outcomes, as measured by increased comprehension and enhanced critical thinking abilities.

To investigate the hypothesis, the study focuses specifically on Master One students in the Department of Biology at Abbes Laghrour University. It aims to assess the impact of integrating interdisciplinary elements into CLIL didactic materials on the learning outcomes of these students, with a keen interest in observing heightened comprehension levels and the development of enhanced critical thinking abilities within this specific academic context.

The research methodology employed in this study is a convergent parallel mixed methods design, gathering both quantitative data from students and qualitative insights from teachers and documents. The significance of this research lies in providing educators, curriculum developers, and language learners with insights to enhance teaching methods, create engaging materials, and foster a more immersive learning environment.

In the discussion of the findings, the study emphasizes the importance of fostering interdisciplinary collaboration, critical reflection, effective communication, and systematic evaluation within CLIL contexts. Addressing identified challenges and leveraging existing strengths are deemed essential for creating a conducive learning environment where students can thrive and develop interdisciplinary competencies.

In conclusion, the research study sheds light on the multifaceted dynamics of interdisciplinary collaboration within the CLIL framework. By identifying strengths and areas for improvement, the study provides valuable insights for educators and curriculum developers striving to enhance the effectiveness of CLIL didactic materials and promote holistic learning experiences among students.

Refrences

Abutalebi, J., & Clahsen, H. (2018, October 23). Critical periods for language acquisition: New insights with particular reference to bilingualism research. Published online by Cambridge University Press.

Alberich i Carramiñana, J., & Florit Ballester, C. . Theoretical framework of CLIL: An overview CLPI AICLE iniciació primària CLSI AICLE iniciació secundària. Department d'Ensenyament. Retrieved from https://ateneu.xtec.cat/wikiform/wikiexport/_media/cmd/lle/clsi/modul_1/clil_theoretical_framework.pdf

Ayapova, T., Kemelbekova, Z., Bukabaeva, B., Abdrakhimova, G., Erzhanova, G., Saifutdinova, A., Aitkazy, S., & Kasymbekova, A. (n.d.). Experience in implementing the methodology of content and language integrated learning in the Training and Retraining Center for CLIL Teachers. *Journal of Interdisciplinary Research*.

Boix Mansilla, V. (2006). Interdisciplinary Learning: A cognitive-epistemological foundation.

Challenges And Barriers To Interdisciplinary Teaching And Learning. (2012). Resource guide developed for "Mixing It Up! Collaborating across the Disciplines" workshop session at the CTLT Institute. Retrieved from UBC Library. https://blogs.ubc.ca/ubcmix/resource-guides/challenges-and-barriers-to-interdisciplinary-teaching-and-learning/

Chettiparamb, A. (2007). Interdisciplinarity. In A. Chettiparamb (Ed.), *Literature Review*.

Dale, R. (2004). Cognitive and behavioral approaches to language acquisition: Conceptual and empirical intersections. *The Behavior Analyst Today, 5*(4), 336–358.

Duncan, S., & Paran, A. (2017, April). The effectiveness of literature on acquisition of language skills and intercultural understanding in the high school context: A research report for The International Baccalaureate Organisation. UCL Institute of Education, University College London (IOE).

Frodeman, R., Klein, J. T., & Mitcham, C. (Eds.). (2018). The Oxford Handbook of Interdisciplinarity. Oxford University Press. https://oxfordre.com/internationalstudies/display/10.1093/acrefore/9780190846626.001.0001/acrefore-9780190846626-e-92

Gabillon, Z. (2020). Revisiting CLIL: Background, Pedagogy, and Theoretical Underpinnings. *Read More 2020*. https://doi.org/10.4000/ced.1836

Gimeno, A., Seiza, R., de Siqueira, J. M., & Martínez, A. (2010). Content and language integrated learning in higher technical education using the InGenio online multimedia authoring tool. *Procedia Social and Behavioral Sciences*.

Hemmi, C., & Banegas, D. L. (2021). CLIL: An Overview. In *International Perspectives on CLIL* (pp. 1-18). Springer.

Interdisciplinary Team Teaching and Content and Language Integrated Learning (CLIL). (2015). Project Tools for Skills – Integrated Learning of English and Forestry – Teacher Training.

Klein, J. T. (2015). Interdisciplinarity: Its meaning and consequences. *Oxford Research Encyclopedia of International Studies*. Retrieved from https://link.springer.com/article/10.1007/s11077-015-9210-4

Klein, J. T. (2018). Interdisciplinarity: Its meaning and consequences. *Oxford Research Encyclopedia of International Studies*. Retrieved from https://journals.openedition.org/ced/1836?lang=en

Klein, J. T. (2023). Interdisciplinarity: Its meaning and consequences. *Oxford Research Encyclopedia of International Studies*. Retrieved from https://www.jstor.org/stable/1167302

Klein, J. T. (n.d.). Interdisciplinarity: Its meaning and consequences. *Oxford Research Encyclopedia of International Studies*. Retrieved from https://oxfordre.com/education/display/10.1093/acrefore/9780190264093.001.0001/acrefore-9780190264093-e-138

Knotts, G., Henderson, L., Davidson, R. A., & Swain, J. D. (2009). The search for authentic practice across the disciplinary divide. *College Teaching, 57*(4), 188-196.

Mardi, & Fauzi, A., & Respati, D. K. (2021). Development of students' critical thinking skills through guided discovery learning (GDL) and problem-based learning models (PBL) in accountancy education. *Eurasian Journal of Educational Research, 95*, 210-226.

Marsh, D., & Frigols Martín, M. J. . Introduction: Content and Language Integrated Learning. University of Jyväskylä, Finland; Valencian International University.

Masih, J. (1999). Learning Through a Foreign Language: Models, Methods and Outcomes. CILT.

Nikula, T., Dafouz, E., Moore, P., & Smit, U. (Eds.). (2016). Conceptualising Integration in CLIL and Multilingual Education. Multilingual Matters. Retrieved from https://www.degruyter.com/document/doi/10.21832/9781783096145/html

Pancheva, T., & Antov, P. (2017). Application of Content and Language Integrated Learning (CLIL) in Engineering Education. University of Forestry, Sofia, Bulgaria. Unpublished manuscript.

Richter, D. M., & Paretti, M. (2009). Identifying barriers to and outcomes of interdisciplinarity in the engineering classroom. *Journal of Engineering Education, 34*(1), 29-45.

Talukder, B. (2019). Introducing interdisciplinary English language classroom in Bangladesh: An assessment. Lecturer in English, Faculty of Arts & Humanities, University of Chittagong, Chattogram.

Wade, B. H., & Stone, J. H. (2010). Overcoming disciplinary and institutional barriers: An interdisciplinary course in economic and sociological perspectives on health issues. *Journal of Economic Education, 41*(1), 71-84.

Wei, Z. (2023, October 7). Navigating digital learning landscapes: Unveiling the interplay between learning behaviors, digital literacy, and educational outcomes. *Journal of the Knowledge Economy*. Advance online publication. https://doi.org/[DOI]

Appendix A: Questionnaire on the Role of Interdisciplinarity in CLIL Didactic Materials for students

Introduction:

Welcome to the questionnaire on the Role of Interdisciplinarity in CLIL Didactic Materials for students. This questionnaire aims to gather insights into your perceptions and experiences regarding the integration of interdisciplinary approaches in Content and Language Integrated Learning (CLIL) materials, particularly in the context of the Biology department at the University of Abbes Laghrour, Khenchla.

Definition:

Interdisciplinarity in CLIL didactic materials refers to the integration of various academic disciplines, such as language learning and subject content, within educational materials and instructional approaches. It involves designing and implementing teaching materials and methods that combine language acquisition with the exploration of other subject areas, fostering a holistic approach to learning. This interdisciplinary approach aims to enhance students' language proficiency while simultaneously deepening their understanding of diverse subjects, promoting critical thinking, and facilitating connections between different fields of knowledge.

Instructions:

Please read each item carefully and indicate your level of agreement by selecting one of the following options: "I agree", "I don't know", or "I disagree".

n	Items	I agree	Idont know	Idisagree
Knowledge of interdisciplinarity				
01	Is Interdisiplinarity in CLIL reflected in activities and involved subjects			
02	There is appropriate resources used for CLIL learning, and adequate curricular materials based on interdisiplinarity			

03	I often think about how different academic fields approach the same problem in different ways			
04	While solving an academic problem, I am good at figuring out which information from outside my own field of study I can use.			
05	I sometimes take ideas from outside my own field of study while working on an academic problem.			
06	I often read about topics outside of my own field of study.			
07	I see connections between ideas in natural sciences and social sciences			
08	In my own research, I typically use multiple research methods drawn from more than one discipline rather than rely exclusively on a single disciplinary approach			
09	Generally speaking, I believe that the benefits of interdisciplinary research outweigh the inconveniences of such work.			
Critical Reflection				
10	I like to think over what I have been doing and consider alternative ways of doing it.			
11	I am able to explain knowledge and ideas from my own field of study effectively to non-experts			
12	I can easily summarise a complex scientific theory.			
Collaboration				
13	Is there coordination between linguistic and non-linguistic teaching staff			
14	I can work well in teams where knowledge and ideas from multiple fields of study must be applied			
15	There is an integrated bilingual projects/units and programmed activities to promote CLIL			
16	I am good at working in teams that include students from			

	outside my own field of study.			
17	I would describe myself as someone who strongly values interdisciplinary collaboration			
18	I am optimistic that interdisciplinary collaboration among ID-SURE collaborators will lead to valuable scientific outcomes that would not have occurred without that collaboration.			
Communication				
19	I can proficiently communicate complex concepts and information from my area of expertise in a way that's easily understandable for those who aren't familiar with it.			
20	I think that I can communicate effectively about scientific theories with students outside my field of study.			
21	I believe I can effectively convey scientific theories to students who aren't in my area of expertise.			

Conclusion

Thank you for participating in this voluntary study. Your input is invaluable in improving CLIL programs. Rest assured that all your responses will be treated with the utmost confidentiality and anonymity by a research team unaffiliated with your center. Thank you for your collaboration.

Appendix B: Techers' interview

Introduction

The questionnaire evaluates various aspects of a CLIL (Content and Language Integrated Learning) program, seeking feedback from participants.

Area 1 Satisfaction of students and teachers:

1. Is there regular measurement of student and teacher satisfaction with the CLIL program?

2. Are strengths and weaknesses in CLIL systematically detected for improvement?

Area 2: Coordination

1. Is there coordination between linguistic and non-linguistic teaching staff?

2. Is there satisfaction with the level of CLIL coordination?

Area 3: Culture of Bilingualism at School

1. Is there an environment of bilingualism/ plurilingualism at University
2. Are there integrated bilingual projects/units and programmed activities to promote CLIL?
3. Is there involvement in international projects and exchanges?
4. Do teachers have specific pedagogical knowledge (CLIL) facilitating CLIL teaching?
5. Are appropriate resources used for CLIL learning, and are there adequate curricular materials?
6. Is the CLIL program adapted to the university context, and is there coordination in planning?
7. Do students reach objectives in the foreign language and non-linguistic areas?
8. Do students obtain certificates of B1 or higher?

9. Is there satisfaction with the CLIL program, and is the department well-regarded by the community?

Conclusion:

Thank you for completing the questionnaire. Your input is crucial for the research on the role of interdisciplinarity in the design of CLIL didactic materials for Master one students in the Biology department at the University of Abbes Laghrour, Khenchla.

Summary :

The study examines the role of interdisciplinarity in the design of CLIL (Content and Language Integrated Learning) didactic materials, aiming to enhance both content understanding and language proficiency. It explores how integrating diverse disciplines can enrich CLIL materials, offering authentic learning experiences that transcend traditional boundaries and promote higher-order thinking skills. Drawing from examples such as analyses by Ana Isabel García Abellán and proposals by Rita Maria de Souza Couto and Cristina Portugal, the study identifies challenges and opportunities in incorporating interdisciplinarity, particularly in Algerian universities like Khenchela University. The research questions focus on the extent of interdisciplinarity in current CLIL materials, its impact on student comprehension and critical thinking skills, and the hypothesis suggests a positive correlation between interdisciplinary elements and improved learning outcomes. The study's methodology employs a convergent parallel mixed methods design, gathering both quantitative data from students and qualitative insights from teachers and documents. Its significance lies in providing educators, curriculum developers, and language learners with insights to enhance teaching methods, create engaging materials, and foster a more immersive learning environment. However, limitations such as methodological challenges, sample size constraints, and potential biases are acknowledged, and the study's scope is delimited to exploring interdisciplinary approaches' impact on CLIL effectiveness across diverse educational settings. Key terms such as interdisciplinarity, CLIL, and didactic materials are defined to clarify their significance within the study's context

ملخص :يقوم البحث بدراسة دور التعددية التخصصاتية في تصميم المواد الدراسية للتعلم المتكامل للمحتوى واللغة (CLIL)، بهدف تعزيز فهم المحتوى واكتساب اللغة. يستكشف البحث كيف يمكن لدمج التخصصات المتنوعة أن يثري المواد الدراسية للتعلم المتكامل للمحتوى واللغة، ويقدم تجارب تعلم أصيلة تتجاوز الحدود التقليدية وتعزز مهارات التفكير على مستوى أعلى. يستمد البحث من أمثلة مثل تحليلات أنا إيزابيل غارسيا أبيلان واقتراحات ريتا ماريا دي سوزا كوتو وكريستينا بورتوجال، ويحدد التحديات والفرص في دمج التعددية التخصصاتية، بشكل خاص في الجامعات الجزائرية مثل جامعة خنشلة. تركز أسئلة البحث على مدى التعددية التخصصاتية في المواد الدراسية الحالية لـCLIL ، وتأثيرها على فهم الطلاب ومهارات التفكير النقدي، والفرضية تقترح وجود علاقة إيجابية بين عناصر التعددية التخصصاتية وتحسين نتائج التعلم. منهجية البحث تعتمد على تصميم الطرق المختلطة المتوازية المتقاربة، حيث يتم جمع البيانات الكمية من الطلاب والتحليلات الكيفية من المعلمين والوثائق. ويكمن أهمية هذا البحث في تزويد المعلمين ومطوري المناهج ومتعلمي اللغة برؤى لتعزيز أساليب التدريس، وإنشاء مواد جذابة، وتعزيز بيئة تعلم غامرة أكثر. ومع ذلك، يتم الاعتراف بالقيود مثل التحديات المنهجية وقيود حجم العينة والانحيازات المحتملة، ويقتصر نطاق الدراسة على استكشاف تأثير النهج التعددية التخصصاتية على فعالية CLIL عبر إعدادات تعليمية متنوعة. ويتم تعريف المصطلحات الرئيسية مثل التعددية التخصصاتية و CLIL والمواد الدراسية لتوضيح أهميتها ضمن سياق الدراسة.