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AI-CLIL: Artificial Intelligence for CLIL methodology

Abstract

Grounded in recent developments related to Artificial Intelligence (AI) and its growing impact on education, this study investigates how CLIL (Content and Language Integrated Learning) teachers perceive and apply AI in lesson planning and classroom practice. Drawing on training initiatives on CLIL carried out during the 2024/25 academic year, the research explores how teachers are using AI to address common challenges, such as time constraints in planning, the need for personalized education, adapting materials to the actual students' levels of competence, managing immediate and effective feedback. During the research a mixed-methods approach was used, combining a quantitative survey involving 249 teachers with qualitative interviews conducted with four experienced CLIL teachers. Thematic analysis of the interviews and open-ended survey responses indicates a generally optimistic view of the potential of AI to enrich student engagement, support personalized learning, enhance language and content acquisition and digital competence. Teachers highlighted the efficiency and adaptability of AI tools in creating dynamic and accessible resources. However, they also raised concerns about inadequate training, limited technological infrastructure, and the absence of clear implementation policies on AI. Overall, the study shows the importance of comprehensive investment in professional development, school resources, and strategic planning to ensure that AI can be effectively integrated into daily teaching practice and foster CLIL pedagogy.

1. *Introduction*

We live in a globalized, interconnected world where change is constant and rapid, especially in the era of Artificial Intelligence (AI), which is reshaping every aspect of society, including education and language learning. In this context, it is crucial for language professionals to adopt a growth mindset enabling

them to rethink and reimagine the language learning process in response to students' evolving needs and contemporary educational challenges.

AI refers to software that produces outputs based on human-defined objectives, using various techniques and approaches. Trained on large datasets, these tools can perform tasks traditionally requiring human intelligence and reasoning. In educational settings, such datasets often include personal information classified as educational data. Therefore, educators should integrate AI tools into instructional designs that prioritize the privacy and security of sensitive information (Punie and Redecker 2017; Vuorikari et al. 2022).

This principle is at the core of the “Ethical Guidelines on the Use of Artificial Intelligence (AI) and Data in Teaching and Learning” (European Commission 2022), a key reference document that outlines the opportunities and risks associated with AI in education. Focused on systems that process large volumes of data, including sensitive data, the document, part of the broader “Digital Education Action Plan”, aims to support the digital transformation of education and training systems across Europe.

Among its key contributions is the development of a legal framework for the use of AI in high-risk sectors, such as education and vocational training, introducing mandatory safeguards for implementation. Complementing this, the UNESCO AI Competency Framework for Students and Teachers (UNESCO 2024) offers a comprehensive guide for integrating AI literacy in education. It highlights the knowledge, skills, and attitudes students and educators need to understand, engage with, and use AI effectively in educational settings.

In the field of language learning, the UNESCO “Guidelines for Generative AI in Education and Research” (UNESCO 2023) underline the potential of Generative Artificial Intelligence (GenAI) to act as an individual tutor, supporting the autonomous development of core language skills. When used within sound pedagogical frameworks tailored to learners' needs, GenAI can foster both receptive and productive language competencies through modeling, correction, and personalized feedback.

In recent years, the intersection of AI and language education has been investigated by several studies. Research identifies AI as a form of artificial scaffolding in language learning, contributing to a paradigm shift that integrates advanced technologies into the language acquisition process.

The implementation of AI-powered technologies, especially dialogue systems, has improved connectivity, boosted efficiency, and reduced uncertainty

in educational processes. AI tools can support personalized, online learning (Cunningham-Nelson et al. 2019; Ellikkal and Rajamohan 2024). Examples include chatbots that engage learners in natural language interactions, assist in daily language practice, answer questions, conduct assessments, and provide tailored feedback (Cinganotto et al. 2024).

Students' active participation in dialogue and immersive learning environments is essential to developing communicative and linguistic competence. Studies (Weizenbaum 1966; Lucas et al. 2014; Fryer and Carpenter 2006; Fryer et al. 2019) have shown that chatbots may reduce learners' anxiety during language practice compared to human interaction.

Parallel research has also highlighted the benefits of AI-based writing assistants in enhancing learners' writing skills, improving linguistic accuracy, coherence, and overall proficiency (Gayed et al. 2022).

In this new educational landscape, structured pedagogical reflection is crucial. This reflection should not only identify the potential of digital tools but should also integrate them into robust methodological frameworks (Rivoltella and Rossi 2024).

From this perspective, the educator's role goes beyond technological proficiency; it requires embedding technology into inclusive, equitable, and ethically responsible learning environments (Pokrivcáková 2019). It is essential to ensure that technology does not exacerbate existing inequalities, but instead provides all learners, regardless of background, with equal access to quality education. Achieving this goal requires continuous professional development that equips teachers to respond effectively to current educational demands and use emerging tools to foster inclusive and innovative teaching practices.

Within language education, AI introduces promising opportunities (Rusmiyanto et al. 2023), offering advanced tools for personalized instruction and continuous support. AI-powered systems, such as chatbots and intelligent learning platforms, enable practice in authentic contexts, simulate real-life communication, and help learners address personalized linguistic challenges (Zawacki-Richter et al. 2019; Cinganotto and Montanucci 2024). These innovations align with the principles of Content and Language Integrated Learning (CLIL), where AI-based tools can combine language acquisition with subject-specific learning, creating rich, authentic scenarios in which learners can truly act as "social agents" (Piccardo and North 2019).

2. *From E-CLIL to AI-CLIL*

CLIL has become increasingly popular in Europe and Italy in recent years (Cinganotto 2016a), considering its potential to foster both language competence and subject mastery. Moreover, it supports the development of a broader range of skills, such as critical thinking, collaboration, communication, and intercultural dialogue.

The literature (Coyle et al. 2010; Coyle and Meyer, 2021; Mehisto et al. 2008; Graziano et al. 2021) has widely highlighted the innovative aspects of CLIL as a student-centered approach that enhances learners' agency, participation, collaboration, and Willingness to Communicate (WTC).

The European Commission and the Council of Europe have long supported the integration of learning technologies to enhance CLIL competences, well before the COVID-19 pandemic, which significantly reshaped the ways teachers and students interact both face-to-face and online, by adopting a wide range of platforms and digital tools (Cinganotto 2016b; Cinganotto 2021).

The term "E-CLIL" (Langé and Cinganotto 2014) was coined to describe the application of learning technologies to CLIL methodology, with the aim to enrich teaching and learning pathways. One of the first projects promoted by the Italian Ministry of Education in 2011 was titled "E-CLIL per una didattica innovativa" ("E-CLIL for Innovative Teaching"). This initiative aimed to guide upper secondary school teachers in discovering and using web tools and platforms for CLIL pedagogy, with support from a group of experts who delivered lectures, webinars, and practical workshops on learning technologies for CLIL. The project was appreciated by the teachers, who designed and implemented E-CLIL modules in their classrooms, reporting high levels of student engagement and enthusiasm. At that time, Web 2.0 tools were primarily used, allowing students to enhance their digital agency and participation through mobile devices, tablets, or laptops, often following a BYOD (Bring Your Own Device) model.

With the advent of the AI revolution in 2022, AI-powered tools began spreading across all school levels and subject areas, including CLIL. Initially, their adoption was met with skepticism and concern, due to fears of being replaced by machines or students using AI in improper ways.

Today, despite ongoing resistance from some more conservative teachers, a growing number of them are more and more engaged with AI tools and plat-

forms. Many appreciate their potential for increasing student participation, gamifying content, supporting lesson planning, and enabling learning analytics.

In the Italian context, for many teachers, AI tools for CLIL, or “AI-CLIL” appears to be a promising solution to several common challenges related to CLIL implementation, such as:

- the lack of tailor-made materials for CLIL across different subject areas
- limited time for planning and content creation
- the need to align materials with students’ actual competence levels
- the demand for personalized content and teaching pathways
- the provision of effective, individualized feedback
- the ability to monitor students’ progress.

These reactions and attitudes seem to be common with teachers from other European countries: studies such as Chounta et al. (2022) reveal that many European teachers, including those in Estonia, have limited knowledge of Artificial Intelligence but view it as a very good opportunity for education. Teachers require targeted support to integrate AI effectively into their practice, as it can enhance their professional efficiency. However, socio-cultural challenges are also highlighted, particularly regarding the use of AI for accessing and adapting multilingual materials.

Another study in the Italian context (Petrucco et al. 2025) shows that Generative AI is increasingly used in schools to support teaching and learning, but its adoption raises ethical and practical challenges, especially in lower grades. Surveying 1,223 teachers from 572 schools, the study found widespread uncertainty about GenAI’s applications and a need for more professional development.

Under the framework of Ministerial Decree 65 (DM65) of 2023, which allowed schools to organize CLIL teacher training programs, many teachers had the opportunity to receive training on both CLIL methodology and the use of AI as an added value to CLIL pathways.

As a result of these training courses, AI-CLIL modules (Cinganotto 2025) were planned and, in many cases, implemented in the classroom.

To investigate how AI-CLIL can support CLIL pathways and address the challenges outlined above, a survey was conducted among course participants, and four teachers volunteered to participate in follow-up semi-structured interviews.

3. *Training initiatives on AI-CLIL*

AI-CLIL training courses were designed to equip teachers with essential tools for planning, implementing, and testing CLIL pathways that incorporate AI-powered tools and platforms as added value. These courses did not aim to be exhaustive or to replace traditional (“analog”) CLIL approaches entirely. Instead, AI tools were presented as opportunities to innovate and “augment” CLIL methodology, tailored to specific learners and educational contexts. It remains the teacher’s responsibility to select the most appropriate and relevant tools and to adapt them to every target of learners.

Among the various AI-based platforms introduced during the training, the most appreciated by the teachers were Twee and Curipod.

Twee (Chen et al. 2024) is an AI-based platform that allows teachers to select a target language and proficiency level based on the CEFR CV (Common European Framework of Reference for Languages, Companion Volume 2020), enabling the creation of teaching materials as language input in second or foreign language classrooms. It is designed to meet practical teaching needs by enhancing multimodal input and supporting vocabulary acquisition through interactive exercises and learning activities with automated, real-time feedback. From a glottodidactic perspective, Twee serves as an effective instrument for facilitating learners’ vocabulary development, enabling targeted morphosyntactic practice, and supporting activities that foster metalinguistic awareness. Teachers attending the CLIL courses found Twee particularly engaging and used it to develop creative and effective teaching material for their students.

Below is an example of a Twee-generated CLIL activity on Biology in English, created by one of the course participants, starting from a video used as a multimodal input.

1

Answer the Questions!

10 points

▶

Biology: Cell Structure | Nucleus Medical Media

Eukaryotic cell

Guarda più... Condividi

Da un canale con un professionista in ambito sanitario abilitato negli Stati...

▶

Nucleus

Guarda su
▶
YouTube

▶ 00:06 - 05:06 <https://youtu.be/URUJD5NEXC8?start=6&end=306>

1 What are the three things that all cells have in common?

Type your answer here...

2 What are the two broad categories of cells, and how do they differ?

Type your answer here...

Figure 1. Example of Twee CLIL activity on Biology in English

Curipod is another platform that exploits Generative AI to enhance lesson planning and actively engage students. It is designed to support teachers by using AI to generate interactive lessons across all educational levels.

This free AI tool can transform a concept or learning objective into a fully interactive presentation, fostering student feedback, and maintaining engagement.

As demonstrated in a study by Moura and Tchiang (2024), students express strong interest in tools like Curipod, particularly for writing revision activities, recognizing their potential for both classroom use and independent learning. In glottodidactic terms, Curipod acts as an effective instructional tool that nurtures learners' creative language use and actively promotes their engagement through interactive and participatory classroom activities. This supports the development of communicative competence by encouraging both expression and collaborative involvement.

The screenshot below shows an example of a Curipod activity created by a CLIL trainee, depicting her idea of "plastic ocean" within a CLIL unit on sustainability. This activity is especially appreciated by students, as it allows them to draw directly on their screens, processing multimodal input creatively and interactively. The added value of this function is the "AI feedback", describing the image and providing an interpretation for it.

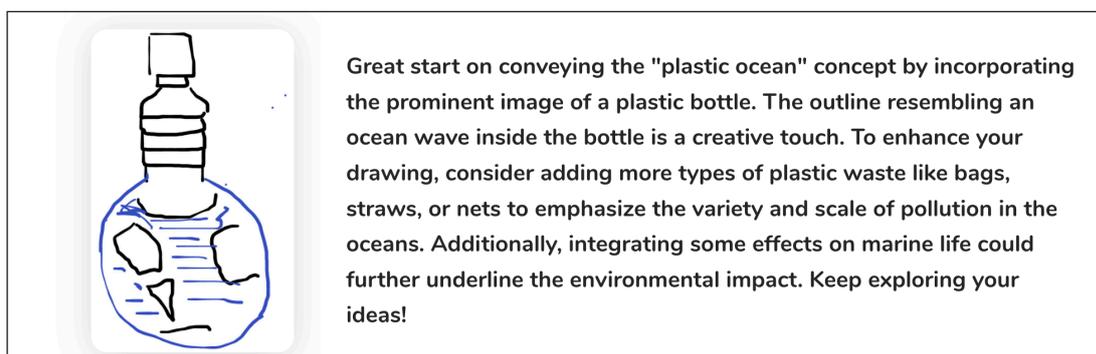


Figure 2. Drawing and AI-feedback in Curipod

4. Research questions and methodological framework

Drawing on the CLIL training initiatives carried out during the 2024/25 academic year, this study aimed to investigate teachers' perceptions and attitudes toward the use of AI in planning and delivering CLIL pathways.

The following research questions guided the research:

- How do CLIL teachers perceive and use AI in their teaching practices?*
- How can AI address key challenges faced by CLIL teachers, such as lack of time for planning and creating content, aligning materials with students'*

actual competence levels, personalizing content and feedback, and monitoring student progress?

Qualitative data were triangulated with a quantitative survey administered to a broader sample of 249 teachers participating in CLIL training courses.

Semi-structured expert interviews (Meuser and Nagel 2009; Kvale and Brinkmann 2009) were conducted with four teachers who had specific expertise in integrating AI into their CLIL teaching practices. These interviews explored pedagogical approaches, integration strategies, specialized knowledge, and training needs.

Each interview lasted approximately one hour and aimed to explore themes that emerged from the online survey in greater depth. The interviews followed a structured guide as follows:

- Personal and professional context
 - What is your professional background?*
 - Have you received specific training in the use of digital technologies or AI?*
- Understanding and perception of AI
 - What does Artificial Intelligence mean to you in the context of education?*
 - What tools or platforms do you use?*
- Practical experiences
 - Can you describe a teaching activity where you used AI-based tools?*
 - In your opinion, what is the added value of AI in terms of planning, instruction, content creation, and personalization?*
- School regulations
 - Are there any regulations in your school regarding the use of AI?*
- Future perspectives
 - How do you envision the evolution of your teaching role concerning AI?*
 - What training needs do you foresee for your professional development?*

The interviews were conducted and recorded via Zoom. Transcripts were analyzed using Thematic Analysis (Braun and Clarke 2006), following these steps:

- a. Familiarization with the data
- b. Generation of initial codes
- c. Searching for themes
- d. Reviewing themes
- e. Defining and naming themes
- f. Producing the report.

5. The online questionnaire

An online questionnaire was administered to a group of CLIL trainees to explore their perceptions of using AI in their teaching practice.

A total of 249 teachers responded to the survey: 40.6% were from upper secondary schools, 31.7% from primary schools, 21.3% from lower secondary schools, and the remainder from adult education and pre-primary institutions.

The majority (87.2%) taught CLIL in English, while smaller percentages used French, Spanish, German, or Italian as a foreign language.

One of the survey questions focused on the frequency of using learning technologies for CLIL. In response, 69.5% indicated they used them “often,” 15.3% said “always,” and 13.3% reported using them “rarely.”

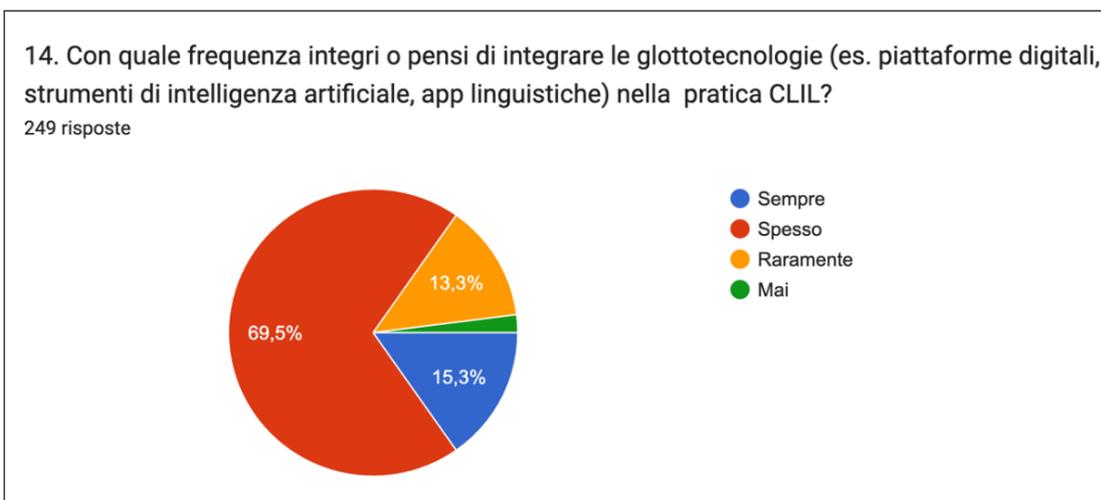


Figure 3. Frequency of using learning technologies for CLIL

An interesting finding from the survey was that 65.5% of respondents expressed a preference for using both analog and digital resources in their teaching, while 33.7% preferred digital resources exclusively. This suggests that learning technologies are becoming increasingly integrated into teachers’ daily instructional practices, complementing rather than replacing traditional methods. Only a very small percentage of respondents indicated a preference for using analog resources alone, highlighting a clear shift towards blended or fully digital approaches in the classroom: digital tools are recognized as an effective complement to face-to-face lessons.

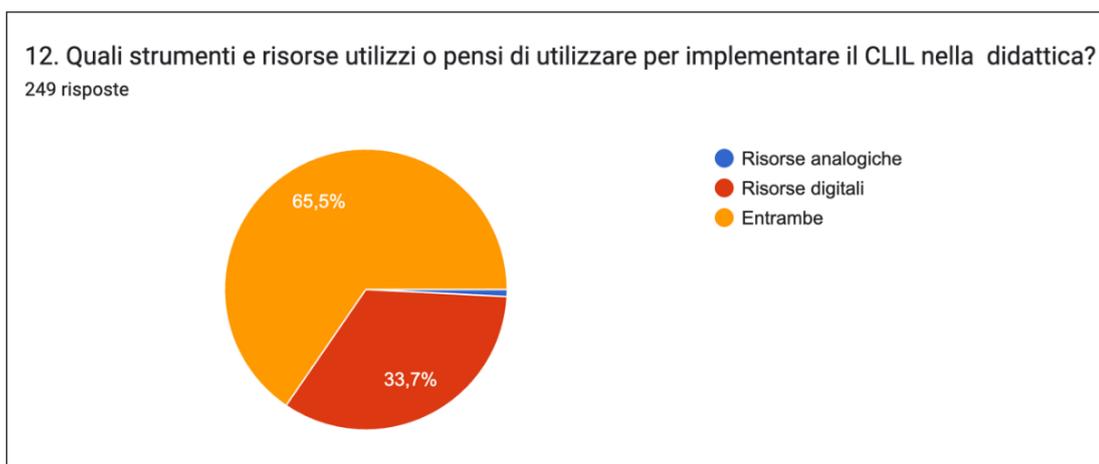


Figure 4. Preferences for analog (blue), digital (red) resources or both (orange)

An open-ended question in the survey was designed to gather teachers' ideas regarding the integration of AI into CLIL practices. The responses were analyzed thematically, and the main points are presented below, grouped according to the Thematic Analysis:

a) *Need for specific teacher training*

There is a pressing need to invest in teacher training in a structured way.

According to some respondents, training opportunities should be increased, but without overburdening teachers with commitments that hinder meaningful participation. Professional development in AI and CLIL should be considered an essential and integral part of the teaching profession.

Respondents called for practical training specifically tailored to the integration of AI in CLIL contexts.

Some respondents suggested offering training that is not only free but also mandatory for all teachers.

Greater investment is necessary in both language and CLIL-specific training. It was also suggested that CLIL and digital education should be embedded into school curricula across all educational levels.

b) *Need for improved IT infrastructure in schools*

According to the respondents, all schools should be equipped with equal access to technologies and educational tools. Effective and up-to-date multimedia resources should be made available across the school system.

Institutional platforms and teacher accounts should be integrated with digital learning technologies. Some respondents suggested that schools should have access to the tools necessary for supporting teachers in the practical application of innovative methodologies, not just in theory, but in everyday classroom practice.

c) *Need for clear policies and strategic planning*

The respondents' remarks showed that a successful implementation of CLIL in Italian schools requires a multi-level, systemic intervention involving policymakers, school leaders, politicians, and educational institutions.

Teachers should be given opportunities, funded by their schools, to get advanced qualifications in CLIL-related fields. One major challenge identified was the limited space for CLIL within the school timetable. The respondents advocated for additional hours to develop at least one CLIL module per semester, preferably through co-teaching models. Overall, the respondents emphasized that a coherent national strategy addressing professional development, sufficient resourcing, and stronger collaboration between schools, institutions, and families would be crucial.

d) *Potential of AI for CLIL: personalization, engagement, feedback, and time efficiency*

The respondents highlighted numerous perceived benefits of integrating AI into CLIL practices, including:

- student engagement and interactivity: AI tools were considered to make lessons more dynamic and captivating
- improved language learning: AI was thought to foster language acquisition through immersive and active learning experiences
- personalization of materials: teachers valued the ability to create tailored resources and learning material
- skill development: AI tools were considered to support not only content and language learning but also digital literacy and metacognitive skills.
- ease of content creation: the respondents were impressed by the possibility to provide customized templates and material
- increased inclusivity: the integration of visual, interactive, and gamified elements was considered valuable for inclusivity

- support for innovative methodologies: AI was appreciated for enhancing innovative, multi-modal teaching techniques
- efficient feedback: automated responses were considered time-saving.

Some sample comments from the respondents are reported below:

- “AI makes the lesson more engaging and captivating.”
- “I believe AI can help create coherent and customized learning units.”
- “It supports inclusion and motivates students through gamification and interactive content.”
- “AI speeds up everything, it helps in preparation and fosters innovative teaching.”
- “It’s easier to create alternative activities and personalize instruction.”
- “These tools promote autonomy, experimentation, and joy in learning.”
- “AI can transform traditional teaching methods and provide more time for direct student interaction.”

6. *The interviews*

Through the online survey, teachers were invited to volunteer for an online interview to further explore the strengths and challenges related to AI-CLIL that emerged from the questionnaire.

The semi-structured interviews aimed to elicit teachers’ reactions and reflections on the use of AI at the upper secondary school level, with particular attention to the potential of AI in supporting CLIL implementation.

6.1. *Profile of the interviewees*

Four CLIL teachers from upper secondary schools were interviewed via Zoom. The details of their geographical range and of the declared training circumstances were erased for anonymity.

Teacher 1 has been teaching history and philosophy for about 20 years. She has also worked as a special needs teacher, which she describes as a highly rewarding experience.

Her first exposure to CLIL was in 2018 during an Erasmus experience in Malta. She found this methodology to be a powerful tool for helping students

understand complex philosophical and historical concepts. She values CLIL not only for its pedagogical advantages but also on a personal level, as it allows her to use English meaningfully. She feels more comfortable speaking English in CLIL lessons due to the purposeful context it provides. Although she has not received specific CLIL training, she acknowledges growing pressure to do so. However, she finds most available training too theoretical and lacking practical application. She believes effective training should be hands-on and directly relevant to classroom practice.

Teacher 2 has been teaching Natural Sciences for nearly 10 years. She completed a CLIL training course that introduced her to the methodology, although she has not yet implemented it in the classroom. Recently, she has gained more confidence and is considering trying CLIL in the next school year. Through recent training, she has become familiar with various digital tools and software, which she believes could enhance student engagement. One major challenge she identifies is her students' limited English proficiency. While some students excel, the majority struggle, making full-English lessons difficult. She has taken both CLIL-specific and subject-related training, which she found helpful. However, limited access to devices and unreliable internet in the classroom often pose a serious obstacle to CLIL.

Teacher 3 has been teaching Economics (with a focus on accountancy) for nearly a decade, following a 20-year career in the private sector.

She first approached CLIL through self-study, researching laws, best practices, and online resources. Currently, she is enrolled in a CLIL course, which she values especially for its digital tools and methodologies. She has already applied some of these strategies in her teaching. She also attended an Erasmus+ course in Barcelona focused on AI-enhanced tools, but she still does not feel fully confident using AI with students. She stresses the need for structured, in-school training led by qualified instructors. Her school currently lacks a formal AI policy, though students begin learning about AI in their second year.

Teacher 4 is interested in teaching history in English, particularly Sardinian history, as a way to promote cultural understanding. He sees CLIL and Erasmus exchanges as powerful tools for meaningful language learning and international collaboration.

He teaches in an urban high school with campuses in Monserrato and central Cagliari. Although he has not yet participated in formal AI training, his school offers such opportunities, and the interest in this topic is growing among both teachers and students.

6.2. *Teachers' perceptions of AI*

Teacher 1: “I think that now we can't escape from using AI tools. It's part of our society, and also of our school.”

She recently held a class discussion on philosophical and scientific revolutions, asking whether AI might be seen as a continuation of the scientific revolution. This reflection inspired her to deepen her own understanding of AI. She uses AI to draft documents and verify ideas, appreciating its precision. In her view, AI supports CLIL by offering valuable tools to engage with both language and content.

Teacher 2: “AI is a great tool in potential, but it's also very dangerous. I fear students might relate to it more than to their own minds. If I assign homework, they can easily generate responses with AI.”

She expressed both caution and curiosity. She sees AI as a powerful tool for simulating experiments and natural phenomena. She believes AI will increasingly be integrated into education.

Teacher 3: “I believe we must embrace AI, study it, and try using it ourselves. It's everywhere, and our students are already immersed in it. Their mindset is shaped by AI. It's not just about cheating.”

She emphasized the need for training. The current range of AI tools is vast and confusing, so clear guidelines would help teachers identify the most effective resources.

Teacher 4: “AI can benefit both teachers and students. For instance, I use AI to generate tests, it saves me minutes of preparation.”

He is skeptical about students' use of AI, questioning their maturity to use it responsibly. While recognizing its potential, he believes teachers must guide students in its proper use.

6.3. *Potential of AI-CLIL to address common challenges*

Teacher 1: “I don’t forbid AI, but I encourage students to understand what should come from themselves and what AI can help with. Some admit they use AI and I appreciate their honesty. AI is useful when students integrate it with their own work and reflection.”

Her students enjoy imagining future scenarios involving AI, like schools with AI teachers or hospitals run by machines. These exercises promote critical thinking. She uses simple AI tools like ChatGPT for lesson ideas, especially for CLIL and she appreciates its outputs. She also reflects on the importance of human mediation in teaching, as no AI machine can replace humans.

Teacher 2: “AI can really help. I’m starting to create tests with it. I’ve also used it to research articles, just asking AI to find content on a specific topic.”

She highlighted the support of AI in lesson planning and interdisciplinary learning, for example, combining science with math or philosophy.

She worries about AI misuse but admits it’s hard to detect. Many students rely on AI when under pressure. She believes AI can support both language and content in CLIL but stresses the need to ease students into English-medium instruction to reduce anxiety.

Teacher 3 stated that students often feel intimidated by CLIL lessons, especially due to low confidence in English. However, digital tools can help break this barrier. She used Curipod to create an interactive lesson in just ten minutes: students wrote, spoke, and voted actively. She also uses YouTube, Kahoot, Magic Tablet, and Wordwall to make learning inclusive and dynamic.

Teacher 4 uses ChatGPT and Gemini to create historical dialogues between students and figures like Caesar or Alexander the Great. These activities are very popular. He builds games using Wordwall and InteractiCity, keeping activities short and engaging. To prevent misuse, he prefers to organize collaborative activities in class rather than assign tasks for homework.

7. Discussion and Conclusion

Since the first “*Norme Transitorie*” issued by the Italian Ministry of Education on CLIL in 2012 and 2014, the use of learning technologies to support CLIL teaching and international exchange has been strongly encouraged.

The recent AI revolution has brought not only new risks and challenges but also new opportunities.

Findings from both the survey and interviews suggest that, despite possible risks and bias, AI can be an added value for CLIL, acting as a “co-teacher”, brainstorming lesson ideas, saving time, and personalizing content. AI is widely recognized by teachers as enhancing CLIL through roles like lesson ideation support, time-saving, dynamic adaptation to learners’ needs, and as a generator of engaging visual and multimedia content that can deepen discussion and critical thought. The major theme across feedback is that AI sharply increases personalization, not just of core content, but also of classroom activities and assessment tools, helping teachers better differentiate for ability and learning profiles. In fact, teachers can customize digital material to suit their students’ needs, levels, and learning styles. Visual content, including images and videos created with AI, can enhance CLIL modules by providing engaging, unusual, or even dystopian materials that stimulate discussion and critical thinking.

Personalization emerged as a key theme: AI supports personalization of content, activities, and assessment.

In response to the research questions:

- e) *How do CLIL teachers perceive and use AI in their teaching practices?*
Teachers generally view AI positively. Despite concerns about cheating, they find it effective for CLIL planning and believe it improves student engagement and motivation.
- f) *How can AI address key challenges faced by CLIL teachers, such as lack of time for planning and creating content, aligning materials with students’ actual competence levels, personalizing content and feedback, and monitoring student progress?*

According to the respondents, AI can help teachers create customized resources quickly, deliver automated feedback, and monitor progress efficiently. Dig-

ital and AI can enhance engagement, support both digital and language skills, and promote active learning and autonomy. AI tools can make content more accessible, foster inclusion, and allow for flexible, gamified, and interactive learning experiences, reducing preparation time, making teaching more innovative and effective overall.

At the same time, the respondents expressed the need for structured training and investment in infrastructure, as integrating AI into CLIL will only reach its full innovative potential if such support systems are put in place. They also advocated for a national strategy that fosters cooperation among all stakeholders to effectively integrate AI into teaching and learning processes, including CLIL pedagogies.

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