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Special Section

EdUNITA – Internationalization through Innovative Teaching and Learning

Guest Editors' Note

This Special Section, EdUNITA – Internationalization through Innovative Teaching and Learning, brings together selected contributions from the first edition of the edUNITA Conference – Conference on Innovative Teaching and Learning, held at the West University of Timișoara, Romania, on 17–18 October 2025.

Organized within the framework of the UNITA – Universitas Montium European University Alliance, the conference provided an international platform for academics and practitioners to share research findings, experiences, and good practices related to pedagogical innovation, internationalization, and contemporary approaches to teaching and learning.

The Special Section includes four peer-reviewed contributions: a paper developed from one of the conference keynote speeches and three papers based on presentations delivered during the conference. All four contributions were revised and further developed for publication.

Together, the papers illustrate different ways in which innovative teaching and learning can support internationalization, institutional collaboration, and the development of more flexible, inclusive, and internationally connected learning environments. Through this collection, we aim to extend the discussions initiated during the conference and contribute to the wider academic dialogue on educational innovation within European higher education and European university alliances.

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The Internationalization Cookbook: Critical ingredients for serving healthy and tasty globalized education

Janneke M. FRAMBACH*

Abstract

Internationalization in higher education is a debated topic in society, politics and higher education itself. Often, the debate centers on one aspect or form of internationalization, such as student mobility. However, definitions of internationalization relate to many different elements of higher education, including curriculum content and structure, pedagogical approach, and organizational and societal context and values. In this article, the author uses a cooking metaphor to explore some of these aspects and how they relate to each other and to dominant definitions and debates on internationalization. The steps of the recipe take you through internationalization research and experiences of educational design and management of international programmes. The key purpose of this conceptual article is to invite readers to critically reflect on their own or their institution's internationalization efforts. A central question that this article asks is: What are critical considerations when selecting, combining and preparing ingredients in order to serve 'healthy and tasty' dishes of internationalized or globalized education that meet students' needs? Rather than presenting a prescriptive approach, the cooking metaphor is used to explore the complexity of internationalization and the limitations of dominant definitions. Taking equity, justice and epistemic plurality in higher education seriously, internationalization and globalization efforts need to involve asking critical and uncomfortable questions, including about how and why these concepts are defined, and creating a diversity of dishes in the process.

Keywords: Internationalization of higher education; Internationalization of the curriculum; Globalization; Decolonization; Educational design

This article is based on a keynote speech that was presented at the edUNITA International Conference on Innovative Teaching & Learning Practices, held in October 2025 in Timisoara, Romania.

* Associate Professor, School of Health Professions Education & Department of Educational Development and Research, Maastricht University, Maastricht, the Netherlands, j.frambach@maastrichtuniversity.nl



Introduction

Internationalization in higher education is a debated topic in society, politics and higher education itself (Marginson, 2026). Historically, the debate has often centered on a limited number of aspects or forms of internationalization, notably student (and faculty) mobility or exchange, and international cooperation (de Wit, 2019). However, definitions of internationalization relate to many different elements of higher education, including curriculum content and structure, pedagogical approach, and organizational and societal context and values (Knight, 2003; Leask, 2015). In practice, many higher education institutes struggle to translate and implement theoretical ideas of internationalization regarding its different elements into their programmes (Marginson, 2026). Moreover, existing definitions and approaches of internationalization have been questioned and critiqued in light of issues of equity, power, postcolonial imperialism and ethics involved (Bamberger and Morris, 2024).

Given these considerations, there is hardly a 'cookbook' approach to the complex and contested phenomenon of internationalization. Still, in this article, I will use a cooking metaphor to explore some of the aspects related to internationalization, and how they relate to each other - not with the intention to present internationalization as a straightforward process, but to explore and underscore its complexity and ambiguity. The steps of the recipe take you through internationalization and globalization research and experiences of educational design and management of international programmes that I was involved in. The key purpose of this cooking journey is to invite you to critically reflect on your own or your institution's internationalization efforts. A central question that this article asks is: What are critical considerations when selecting, combining and preparing ingredients in order to serve 'healthy and tasty' dishes of internationalized education that meet our students' needs? The cooking metaphor - i.e. the steps of the recipe which discuss my experiences - serves as a tool to explore this question.

As a disclaimer, I am not a chef. In full disclosure, I don't even enjoy cooking. Perhaps that is precisely why I chose to use this metaphor. We all need to prepare food to provide nutritious and preferably tasty meals for ourselves and our families. Some of us are natural talents in this area, while others, such as me, struggle in the process - but we all have to engage with it. Internationalization and globalization are phenomena that we as educators in higher education also have to engage with, whether we like it or not, and whether we are 'natural talents' in this area or not. As with my cooking, I find myself struggling with internationalization. Hence, I considered it may be helpful to explore a 'simple' recipe together, such as cooking an omelet, and discuss critical considerations at each step. Before we move to the recipe, I briefly provide more background on internationalization debates and definitions.

Defining and debating internationalization

In my national context of the Netherlands, public and political debates on internationalization in higher education have largely focused on numbers of international students, and the perceived consequences this may have for local students, language, society and economy (Altbach & de Wit, 2018; NRC, 2024). Similarly, in other European countries there is “debate about the negative impact of English on the quality of teaching” (Altbach & de Wit, 2018, p.3). Dominant definitions of internationalization in the scientific field, however, move beyond this arguably narrow focus on internationalization. The well-known definition by Knight (2003) defines internationalization “at the national, sector and institutional levels” more broadly as “the process of integrating an international, intercultural, or global dimension into the purpose, functions or delivery of postsecondary education” (Knight, 2003, p.2). This highlights that internationalization does not only take place “abroad”, but also “at home” (Knight, 2004), and that it relates to “all aspects of education and the role that it plays in society” (Knight, 2003, p.2). Leask’s influential work on internationalization at home expanded on this definition and defined “internationalization of the curriculum” as the “incorporation of international, intercultural, and global dimensions into the content of the curriculum as well as the learning outcomes, assessment tasks, teaching methods and support services of a program of study” (Leask, 2015, p.9).

While dominant in educational literature, these definitions and perspectives on internationalization have increasingly received critique and are being debated in the global scientific field. The universal connotation of the definitions has been criticized, as they have been argued to reflect Euro-centric or Western-centric perspectives (Ndlovu-Gatsheni, 2021; Heleta & Chasi, 2023; Marginson, 2026). As a response, Heleta and Chasi (2023) deployed a decolonial lens to explore an alternative definition of internationalization for their South African context, and possibly beyond. Their proposal is to define internationalization in South Africa as “a critical and comparative process of the study of the world and its complexities, past and present inequalities and injustices, and possibilities for a more equitable and just future for all. Through teaching, learning, research and engagement, internationalisation fosters epistemic plurality and integrates critical, anti-racist and anti-hegemonic learning about the world from diverse global perspectives to enhance the quality and relevance of education” (Heleta & Chasi, 2023, p.269-270). Related critiques of the dominant perspective on internationalization have pointed to its misalignment with plural reality and the challenges that it yields for operational practices (Marginson, 2026; Zhang & Cao, 2024). Moreover, several authors have problematized the term “internationalization” due to its limited focus on relations between nations and its Western-centric connotations, and proposed terminology that reflects more global, decolonial and ‘pluriversal’ perspectives (Ndlovu-Gatsheni, 2021; Marginson, 2026).

As educators we have to navigate this landscape of different perspectives, challenges and interests, in which each context requires its own considerations. During the keynote

What are key topics in the debate about internationalization in higher education in your context?

43 respondents



Made with Wooclap

Figure 1. Word Cloud of responses during edUNITA keynote speech, October 2025.

held at the edUNITA Conference, which formed the basis of this article, I asked the audience - which consisted mainly of educators from higher education institutes across European countries - what were key topics in the debate about internationalization in higher education in their contexts. Figure 1 is a word cloud that reflects their responses. Many of the aspects discussed above are represented in the figure, from ethics and equity to language and numbers, which confirms that internationalization is a multi-faceted construct and is experienced as such. We now turn to the cooking metaphor to explore some of these facets in more detail, including how they relate to the definitions and debates presented above.

Cooking an internationalization omelet in six steps

The title of this section may raise the expectation that there is an easy step-wise approach to internationalization (or globalization). As highlighted above, even definitions of internationalization are contested, let alone its approaches. The following sections reflect my personal journey and experiences in internationalization and globalization research and educational design and management, which are flavored by my personal positionality and context. I am a multidisciplinary social scientist working in the field of health professions education at a Dutch higher education institution. Manifestations and

implications of globalization, internationalization and diversity have always been major themes in my research, life and work. I attempt to approach these themes through critical lenses, yet at the same time I acknowledge that I am naturally biased by my experiences and background. So is my choice for the omelet recipe, which may be a common dish in my context, but perhaps not in yours. As I take you through internationalization and globalization research and experiences below, I invite you to ‘create your own version of the omelet’, reflecting on your own context, lenses, and the needs of your students. An omelet is perhaps the opposite of a universal dish: it is personalized by each person that cooks it. A quick online search shows that it is believed to have roots in ancient Persia, from where it evolved into different variations across many cultures, such as the Spanish *tortilla de patatas* and the Japanese *omurice*.

What unites us as educators is that we all want to serve ‘healthy and tasty’ education to our students: education that matters, that shapes them as responsible and healthy future professionals, and education that they enjoy in the process. To achieve this, the level of sophistication of the ‘dish’ is not the most important aspect. Also with simple ingredients one can cook a healthy, tasty meal, such as an omelet. However, it matters how the ingredients are selected, prepared, combined and served. In the film “The Hundred-Foot Journey” (Hallström, 2014) it becomes clear that cooking a ‘perfect’ omelet requires technique, skill and respect for ingredients, and also that great cooking can transcend cultural boundaries. Applying this metaphor to internationalization in higher education, I will now reflect on my considerations for a healthy and tasty omelet.

1. The eggs: your curriculum content

An omelet’s main ingredient are eggs. Selecting good quality eggs is paramount for the taste of your omelet. Translating this to internationalization in higher education, the content of the curriculum is your main ingredient. It is the foundation upon which to build students’ experiences; it is what you want your students to learn about. It refers to the first part of Leask’s definition of internationalization of the curriculum: “the

incorporation of international, intercultural, and global dimensions into the *content* of the curriculum” (Leask, 2015). Research however shows that educators have blind spots in this area.

Zanting et al.’s (2020) work describes an example from the medical education domain. Their research investigated in which parts of educational materials of three undergraduate medical programmes in the Netherlands cultural diversity was constructed, and how. They found that ‘culture’ or ‘cultural characteristics’ were only mentioned when the (patient) case deviated from a “standard Dutch or Western patient or disease”, or in elective curriculum parts (Zanting et al., 2020). The authors argued that these mechanisms of othering and stereotyping resulted in an “embedded notion of ‘problematic stranger’”, in which culture was constructed as something problematic and not relevant for ‘standard’ medical knowledge (Zanting et al., 2020). This highlights the relevance of Heleta and Chasi’s definition of internationalization presented above, which

emphasizes attention for critical study, injustices, equity and anti-racism (Heleta & Chasi, 2023).

In another study, Zanting et al. (2025) reviewed how cultural diversity was conceptualized and employed in common approaches to cultural diversity education in medical education. They identified four different ways in which cultural diversity was conceptualized: 1) culture as a fixed patient (or student) characteristic (viewing individuals based on one static aspect, such as their nationality, religion or gender); 2) culture as multiple fixed characteristics (viewing individuals based on multiple intersecting static aspects, such as nationality, religion *and* gender); 3) culture as a dynamic outcome impacting social interactions (viewing yourself and others fluidly through the product of interactions); and 4) culture as medical culture's power dynamics (viewing your and other's identities as shaped by systems of inequality and power imbalances) (Zanting et al., 2025). The authors found commonly used approaches to cultural diversity education to be based on these conceptualizations, including cultural competence (mainly conceptualization 1), intersectionality (mainly conceptualization 2), cultural humility (mainly conceptualization 3), and critical consciousness (mainly conceptualization 4) (Zanting et al., 2025). Notably, Zanting et al. reported that these conceptualizations were rarely made explicit in the used approaches, yet one can easily imagine that the conceptualization you select has consequences for what your students will learn in this area. Incorporating international, intercultural and global dimensions into the content of the curriculum should therefore be handled with caution. Zanting et al.'s (2020; 2025) work, in line with Marginson (2026), suggests that it is important to ask ourselves what we actually mean when we say "intercultural", "international", or "global", and how we then translate this into curriculum content.

Something that could help in this process is to consider who is represented in decision-making about curriculum content. Giuliani et al. (2020) explored medical education literature to investigate, from an anti-colonial perspective, who was involved in the development of global oncology curricula. They reported that existing global oncology curricula are heavily influenced by Western male authors, which "as a result may not incorporate relevant socio-cultural perspectives impacting care in diverse geographic settings" (Giuliani et al., 2020, p.9). In sum, selecting our 'eggs' needs to happen with great care and attention for our blind spots. Critical considerations for internationalized or global curriculum content that can be derived from the research described above include attention for representation of diverse voices in decision-making, consistent integration of intercultural elements in all curriculum parts rather than in selective cases, making conceptualizations of international, intercultural and global explicit and acknowledging our own position in these dynamics, avoiding othering and stereotyping based on static aspects, and showing awareness of power dynamics. Analyzing existing curriculum content with these considerations in mind may contribute to the 'quality of the eggs'.

2. The tools: your pedagogy

The next step of the recipe is to whisk the eggs with a mixer, a tool that gets them ready to be processed further. The 'how' of handling the eggs matters, as it determines the way in which they will ultimately be consumed. In higher education internationalization or globalization, the tools (mixer) to handle the curriculum content (eggs) refer to pedagogical tools, or teaching and learning activities. Following Leask's (2015) definition, it suggests incorporating international, intercultural and global dimensions into the *teaching methods* of an educational programme. These methods and tools determine how students will learn, which simultaneously impacts what they will learn. The question can be raised what is meant by incorporating such dimensions into teaching methods or approaches.

Analyzing the case of problem-based learning (PBL) in medical education, which has been promoted as an active, student-centered, collaborative, self-regulated approach to learning (Dolmans, 2019), some reflections related to this question come to surface. In the international practice of higher education, pedagogical approaches and innovations, such as PBL, are traveling the world, yet their assumingly universal nature is rarely questioned (Frambach, 2014). Since PBL's inception in Canadian medical education in the 1960's, this concept spread across the world and was adopted in higher education institutions in many different settings (Frambach et al., 2019). One could argue that this reflects an international or global dimension to the teaching method; adopting innovations that were developed elsewhere and that are used globally. However, cross-cultural research on implementing PBL across contexts has emphasized that this is not a straightforward process and that it may have unintended consequences (Frambach et al., 2019). Frambach's (2014) work on the cross-cultural applicability of PBL in medical education concluded that PBL looks different everywhere and that it is not a matter of 'one-size-fits-all'; context-sensitive adaptation is key (Frambach, 2014). The author furthermore suggests that the choice for PBL is not always taken for the right reasons, as institutions internationally have been pressured into PBL adoption due to funding regulations, accreditation requirements or ranking considerations (Frambach, 2014). Consequently, the worldwide spread and adoption of PBL has been named a new wave of Western imperialism and neo-colonialism (Bleakley et al., 2008; Frambach et al., 2019).

This suggests that incorporating international, intercultural and global dimensions into teaching methods requires critical analysis of both the pedagogical approach itself and the local context and needs. Regarding PBL, Frambach et al. (2019, p.938) state that "the term PBL as a singular and universal concept has no global future. Globally, we can only talk about PBL in the plural sense", where each institution ideally is free from pressure and can determine its own version of PBL or an entirely different approach. Some years ago, my own university engaged in a university-wide research project to critically examine and rethink its local version of PBL, which resulted in a position paper and report with local recommendations for teaching, educational design and management (EDview, 2018a; 2018b). An approach that can help in the process of

creating contextualized pedagogical tools is design-based research, which involves close collaboration with stakeholders in educational design (Dolmans 2019; 2012). This can also be used to develop internationalized education with stakeholders across borders. Kolm (2025) for example used design-based research to develop and evaluate an interprofessional collaborative online international learning (ICOIL) in health and social care professions students of four European countries. The study reported positive outcomes of students' international online collaboration competencies (Kolm, 2025).

In sum, internationalization of teaching methods requires asking critical questions, such as: What are the cultural beliefs, norms and values expressed by our pedagogical approach? What is the history of this approach, where did it originate? What is our practice of the approach? How does it relate to our students' and teachers' backgrounds and experiences? What are our explicit and implicit expectations of students and teachers? Are other approaches possible or desirable? Do we engage in these discussions with our students and teachers? Do we involve them in educational design? These considerations again relate to Heleta and Chasi's (2023) decolonial definition of internationalization, which emphasizes epistemic plurality and integrates critical and anti-hegemonic learning. We can't just choose any mixer to whisk the eggs – they come in different forms and shapes - and we have to select our tools with care.

3. The spices: your values

The whisked eggs need flavor. Adding spices is the next step in the recipe. It is a relatively short step, but a decisive one for the flavor and taste of the dish as a whole. In internationalization in higher education, flavors are created by the values that spice and underpin the internationalization approach - and in that sense this fundamental step is perhaps better placed before step 1 and 2 in the internationalization recipe. Following Knight's definition, it refers to "integrating an international, intercultural, or global dimension into the *purpose* [...] of postsecondary education" (Knight, 2003, p.2). Values are about the *why* (or *why not*) of internationalization and they shape the decision-making in this area. Existing literature has highlighted different rationales and motivations of institutions to engage in internationalization efforts (Knight, 2004; Zhang and Cao, 2024), which have implications for educational quality.

In medical education, Brouwer et al. (2020) looked into implicit values underpinning internationalization efforts by investigating ethical concerns surrounding international medical programmes. By asking how academic staff in international medical programmes experienced ethical issues surrounding their programme, the authors identified three ethical dilemmas related to the purpose of internationalization. First, the concern of "homogenization of teaching methods and content": staff were positive about the fact that their international programme resulted in exposure to best practices in education and healthcare for students, but at the same time they noted that education quality and teacher autonomy were at risk because curriculum decisions were guided by foreign regulatory bodies (Brouwer et al., 2020). Second, the concern of "marketization of

medical school access”: staff were positive that their international programme widened access for students from countries with limited medical school capacity, but simultaneously noted that their programme served as a “back door into medical education for students who were not selected in their home country” (Brouwer et al., 2020). Third, the concern of diversification of the student population: staff were positive about the opportunities their programme offered for intercultural learning, but noted student well-being to be at risk due to stereotyping and discrimination by teaching staff (Brouwer et al., 2020).

These concerns relate to questions raised by Knight (2004) about the rationales and challenges involved in pursuing internationalization efforts. One can see that there will be a difference in decision-making about curricula if the main purpose is to generate income, to raise international reputations, or to enrich knowledge and student development. These different spices will give different flavors to the dish of education. Some spices might go well together to create a flavorful and impactful meal, while other combinations may ruin the dish. In this light, the commercialization of internationalization has received substantial critique (Bamberger and Morris, 2024), and it has been argued that internationalization has oftentimes been pursued as a goal in itself rather than a means toward addressing educational issues (Brouwer and Frambach, 2021). In sum, it is important to make explicit the values and purposes underpinning internationalization efforts, as well as considering the implications for ethical issues and educational quality. It involves approaching internationalization as a means, not an end, and asking the critical question: What do I aim to achieve and why?

4. The pan: your context

The next step is to pour the egg mixture into a pan. The interaction between the mixture and the characteristics of the pan – its size, temperature, material, being buttered or not – further shape the omelet’s quality. In internationalization or globalization, the pan can serve as a metaphor for the context in which education takes place, and in this process it is crucial to consider characteristics of the context. A problem that surfaces in this regard is the question which context to consider: The immediate context of the institution? The contexts that international students are from? The contexts that graduates will move to? A global context? Is it possible to define that? Balancing between global and local perspectives, or standardization and contextualization of education, has been a long-recognized tension in medical education and beyond (Prideaux, 2019; Bates et al., 2019; Brouwer and Frambach, 2021). A longitudinal study by Brouwer et al. (2022) made this tension visible when considering the question of context in international medical education. The study investigated early career experiences of 188 graduates of seven international medical programs in Europe and Asia, and found that graduates moved to many different contexts, for which their training did not always prepare them well in terms of clinical exposure, language issues, and international career orientation and transition guidance (Brouwer et al., 2022). The authors concluded that international

programmes, which essentially prepare students for careers elsewhere, have a responsibility for preparation and practical guidance that is currently lacking in these curricula, and that “there is a world to win” in embracing opportunities of globalization in these programmes (Brouwer et al., 2022, p.264).

Next to the future work contexts of students, internationalization efforts have to be embedded in the institutional context. A popular internationalization strategy among higher education institutions is to engage in international institutional partnerships, such as crossborder curriculum partnerships, where the intention is to deliver identical or comparable curricula across institutions internationally (Waterval, 2018). Waterval’s (2018) work explored challenges, opportunities and strategies of managing international curriculum partnerships, and found that challenges related to governance, quality control, staff buy-in, faculty development, relationships, logistics, language and communication could all potentially cause friction in the partnership. Strategies such as capitalizing on the unique global learning environment and fostering cultural intelligence at all levels of the institution were suggested as ways to contribute to partnerships’ success (Waterval et al., 2018).

The research described in this section underlines the need to critically consider context in its broad sense in internationalization efforts. Considerations such as who are your students, who are your graduates, and what is your institutional context are key to determine a suitable ‘temperature, material and size of the pan’. Notably, support services, as mentioned in Leask’s (2015) definition of internationalization of the curriculum, are easily overlooked aspects of the context in internationalization efforts, but can play crucial roles as evidenced by Brouwer et al.’s (2022) findings on the experienced lack of career and transition guidance among international graduates, and Waterval’s (2018) work on international partnership management. Additionally, the global-local tension, as mentioned above, is characteristic of the debate on context in internationalization. Bates et al. (2019) suggest to shift focus from viewing contextualization and standardization as competing concepts, to analyzing how these concepts interact, as a way to embrace and navigate the tension. This aligns with the focus on studying “the world and its complexities” in Heleta and Chasi’s (2023) definition of internationalization. The recipe is not a clear-cut process. The interaction between each type of pan and each particular egg mixture will result in different omelets, but all can taste good if these elements are critically and carefully aligned.

5. The cooking: your curriculum structure

When the egg mixture has been poured into the pan, the cooking starts. Through cooking, and dependent on cooking temperature and duration, the omelet slowly reaches its structure, from liquid to solid. In education this can be translated into the structure of the curriculum. It relates to “integrating an international, intercultural, or global dimension into the [...] *functions or delivery* of postsecondary education” (Knight, 2003, p.2).

Designing a suitable curriculum structure that involves these dimensions requires care and effort, as I have experienced in my work as well.

I am involved in a Master of Health Professions Education programme in my institution, which is a two-year, part-time, largely online programme (SHE, 2026). Our students are working health professionals residing in many countries across different continents, looking to develop their competencies as educational designers, leaders or researchers in health professions education. Internationalization has been a “leading principle” in this curriculum for the purpose of enriching education and tailoring education to the specific yet diverse student population (SHE, 2026). In this programme, internationalization is practiced as “learning with and from fellow students from all over the world and from different professional backgrounds”, learning to “apply educational theory to different contexts”, and “continuous exchange of best practices and staff expertise” (SHE, 2026). The curriculum structure has been designed in a way to support these purposes and practices. The curriculum is based on authentic learning tasks derived from the professional practices of educational designers, leaders and researchers. Students are encouraged to contextualize these tasks to their local setting and needs. Around sixty percent of the curriculum consists of elective learning tasks, enabling students to personalize their curriculum and self-regulate their learning. The programme is competency-based and employs portfolio-based programmatic assessment, supported by a coaching programme. Examples of competencies include “navigating diversity”, which includes considering context and collaborating with diverse stakeholders, and “taking a critical and reflexive stance”, which includes awareness of personal biases and critically evaluating claims and beliefs (MHPE, 2026). Next to elective tasks, there are mandatory learning tasks in which students collaborate in small, international and interprofessional groups. The programme collaborates with several partner sites and teaching staff abroad.

While student evaluations and staff experiences show that many of these aspects are valued positively, at the same time the programme runs into struggles related to internationalization. International collaboration and communication among partners, as well as students and staff, require continuous attention and sensitivity. Additionally, programme management has attempted to make a start with decolonizing the curriculum, as the large majority of theories and frameworks used are Western-based, as well as the perspectives of teaching staff. Decoloniality “foregrounds reclaiming, reframing, and recentering of Indigenous knowledge systems, methods, and languages, and correcting deficits created by colonialism and maintained by coloniality” (Naidu, 2021, p.S10). The programme is struggling with this aspect, yet to counter Euro-centrism it is crucial – in international programmes specifically but in fact in any programme – to examine curricula from a decoloniality lens (Naidu, 2021). In sum, critical considerations for ‘cooking’ an international or global curriculum structure may involve strategies that encourage contextualization and personalization of learning, international collaboration, attention for personal positionality and reflexivity, and decolonizing curricula.

6. The toppings: bringing it together

When the egg mixture has reached its intended structure, it is time to add toppings of your liking, such as cheeses, vegetables, meats, herbs or a combination of these. The toppings bring it all together – quite literally when you fold one half of the omelet over the toppings that are added on the other half. What's important for taste and nutrition is that all ingredients are balanced and in alignment. The same goes for internationalization. In the recipe that we have explored, curriculum content (the eggs), pedagogical approaches (the tools), purpose and values (the spices), contexts (the pan), and curriculum structure (the cooking) are interrelated and therefore need to be closely aligned. Unlike the omelet recipe, the six steps may not be followed chronologically in the case of internationalization. In the example of the Master of Health Professions Education programme discussed in the previous section, the curriculum structure reflects the contexts of students and the values of the institution's perspective on internationalization, which subsequently shapes its pedagogical tools and curriculum content. For a tasty and healthy internationalized or globalized omelet, alignment matters more than chronologicity of the recipe steps. Misalignments in perspectives on internationalization in medical education have been found to create tensions, conflicting practices and confusion among learners, teachers and other stakeholders (Brouwer et al., 2025). This risks affecting learning outcomes, which are a main focus in Leask's (2015) definition of internationalization of the curriculum.

The internationalization research and experiences of educational design and management of international programmes discussed in the recipe touch upon different aspects of the dominant definitions of internationalization. Above, we explored issues related to content, teaching methods, learning outcomes, support services, purpose, functions and delivery of higher education. The definitions initially were helpful to identify a breadth of elements to consider in internationalization. However, with each of these aspects, critical questions were raised that point to the theoretical and practical limitations of the definitions, which supports the critique they have received (Ndlovu-Gatsheni, 2021; Heleta & Chasi, 2023; Zhang & Cao, 2024; Marginson, 2026). An alternative definition provided by Heleta and Chasi (2023), originally designed for internationalization in South Africa, seemed to align with many of the critical issues raised and considerations proposed.

My personal 'toppings' (considerations) for a healthy and tasty globalized omelet, shaped by my research and other experiences, include attention for representation, power dynamics, cultural humility and reflecting on one's own position, decoloniality, plurality and involvement of different voices, complexity of contexts and ethics, and making conceptualizations and intentions explicit. This is hardly a simple recipe. My struggle continues, both in the kitchen and in my educational efforts, trying to embrace the complexities. The issues presented, moreover, reflect considerations on a general level rather than practical recommendations. Internationalization requires not only high-level discussion, but also detailed decision-making about practical aspects such as

languages, which was a topic mentioned by participants of the edUNITA conference (Figure 1).

The aim of this article was to invite you to critically reflect on your own or your institution's internationalization efforts, and the six steps intended to support this invitation. While the cooking metaphor enabled a journey through specific internationalization and globalization research and experiences, it notably has limitations, including a possible underrepresentation of structural, political, historical and funding issues. This reinforces the article's key purpose of inviting critical reflection and encouraging critical questions. What are your ingredients? What is your dish? Why are you serving this one and in this way? How are you preparing the ingredients? Is there an ingredient missing? Or used too much? If we are serious about equity, justice and epistemic plurality in higher education, internationalization and globalization involve asking critical and uncomfortable questions, including about how and why these concepts are defined. I shared some of my questions and urge educators and institutions to explore their own questions – they may be similar or different, they may be fewer or more, but they are a crucial step to transform dominant Euro-centric and Western-centric perspectives and approaches to internationalization. As a call for future research, I invite you to share your critical internationalization or globalization recipes and dishes, including the struggles and the successes. I look forward to continue learning from a plurality of recipes in search of healthy and tasty globalized education.

AI Use Statement

In the writing of this article no artificial intelligence (AI) tools were used.

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Consultancy-Based Interdisciplinary Project-Based Learning in Engineering Education: Integrating Technical Design and Production Planning

Pedro Dinis GASPAR*, Martim Lima AGUIAR**, Tânia Miranda LIMA***

Abstract

Background: Engineering education often separates technical design from production planning, although professional product development requires these forms of reasoning to evolve together.

Aim: This article analyses a consultancy-based interdisciplinary project-based learning model implemented between the “Introduction to Electromechanical Project” (IEP) and the “Introduction to Industrial Project” (IIP) courses.

Method: The study follows an implementation-oriented qualitative descriptive case-study design, supported by documentary analysis of project briefs, milestone criteria, student presentations, meeting minutes, consultant reports, photographs, and an anonymous satisfaction questionnaire.

Findings: The documentary evidence shows how two IEP groups developed rover-based project concepts while six IIP consultant groups translated those concepts into production-planning, manufacturability, quality-control, logistics, and cost scenarios. Questionnaire results from 25 of 32 students indicated favourable perceptions, especially for skills development, teamwork, communication, and problem-solving, while also identifying coordination between courses as the main operational challenge.

Contribution: The article provides a transferable implementation framework for integrating technical design and production planning through structured inter-course consultancy.

Keywords: consultancy-based learning; interdisciplinary engineering education; project-based learning; production planning; documentary analysis

* Associate Professor with Habilitation, C-MAST—Center for Mechanical and Aerospace Science and Technologies, Department of Electromechanical Engineering, University of Beira Interior, Covilhã, Portugal, dinis@ubi.pt

** Invited Assistant Professor, C-MAST—Center for Mechanical and Aerospace Science and Technologies, Department of Electromechanical Engineering, University of Beira Interior, Covilhã, Portugal, martim.aguiar@ubi.pt

*** Assistant Professor, C-MAST—Center for Mechanical and Aerospace Science and Technologies, Department of Electromechanical Engineering, University of Beira Interior, Covilhã, Portugal, tmlima@ubi.pt



1. Introduction

Engineering education frequently places technical design and production planning in neighbouring, but weakly connected curricular spaces. Students may learn to size a system, select components, or reason about functional performance in one course, while learning process planning, organisation, and quality control in another. Yet industry rarely separates these logics. Product definition, manufacturability, cost, maintenance, supply, and risk evolve together, especially in electromechanical systems where structural, electrical, electronic, and control decisions interact from the outset (Jamnia, 2016, 2023; Magleby et al., 1996).

This paper addresses that problem through a consultancy-based inter-course pedagogical practice linking two third-year undergraduate courses at the University of Beira Interior: “Introduction to Electromechanical Project” (IEP), attended by students in Electromechanical Engineering (EME), and “Introduction to Industrial Project” (IIP), attended by students in Industrial Engineering and Management (IEM). In the local design, IEP students developed the technical design and sizing of the electromechanical products or systems, while IIP students worked on the associated production process, decentralised production logic, organisation, and industrial planning. IIP groups were positioned as consultants to IEP groups, so that the same product would be discussed simultaneously from technical and production perspectives.

The paper brings together four complementary layers of analysis. First, it explains the pedagogical architecture of the intervention and its literature-informed rationale. Second, it details the semester project brief and the periodic milestone structure that organises student work. Third, it incorporates documentary and visual evidence from two IEP groups, created and named by student groups as “Advanced Logistics Mobile Assets” (ALMA) and “Engineering for Protection and Advanced Mobility” (EPAM), to illustrate how students interpreted the brief, generated concepts, documented decisions, and publicly defended their evolving projects in mixed sessions. Fourth, it incorporates IIP consultant presentations to show how industrial-project students translated those same concepts into proposals for production architecture, equipment selection, routing, testing, bottleneck management, and economic structuring.

The article presents the design and implementation of an inter-course pedagogical model rather than a controlled impact study. Its value lies in making the local pedagogical architecture explicit, evidencing how the work unfolded over time, and showing how authentic project artefacts can be mobilized as scholarly evidence in engineering education. The foundation is that the consultancy-based model becomes more pedagogically credible when its internal evidentiary chain is visible: not only the intended learning design, but also the project brief, the periodic criteria, the evolving concepts, the meeting records, and the milestone artefacts produced by students. In addition to exposing EME students to industrial engineering and management concepts, and IEM students to mechanical, electrical, and electronic design concepts, the model also

supported the development of transversal competencies, including multidisciplinary communication, team building, discussion, and work organisation.

The study was guided by three research questions:

RQ1. Can a consultancy-based inter-course pedagogical model be structured to connect technical design and production planning?

RQ2. How can students produce evidence of the evolution of technical and industrial reasoning during the semester?

RQ3. How did students perceive the pedagogical value and operational difficulties of the interdisciplinary consultancy model?

2. Literature-informed rationale

2.1. Interdisciplinary project-based learning in engineering

Project-based learning is widely used to connect engineering theory with application. In electromechanical and adjacent engineering fields, recent work associates project-based formats with stronger engagement, improved problem framing, and better alignment with professional practice. However, the literature also stresses that project-based approaches are demanding to sustain: they require curriculum coordination, explicit assessment structures, and clear milestones if students are to move beyond unstructured enthusiasm toward defensible engineering decisions (Graham & Crawley, 2010; Shekar, 2014; Kunicina et al., 2024; Mahtani et al., 2026). This caution is especially important when work is distributed across more than one course. Inter-course initiatives can strengthen systems thinking because students must understand how technical and organisational decisions influence each other, but they also increase the demands on coordination. Students need explicit opportunities to negotiate interfaces, clarify roles, and understand stakeholders beyond their own disciplinary comfort zone. The value of such interaction is repeatedly emphasised in engineering education literature that links teamwork, stakeholder analysis, and authentic project work, although there are several difficulties when putting this model in practice (Savage et al., 2007; Howcroft et al., 2023; Todd et al., 1993).

2.2. Integrating design and production reasoning

The need to connect technical design with manufacturing-oriented reasoning is well established in systems approaches to product development. Electromechanical products require the coordinated treatment of mechanics, electricity, electronics, sensing, control, manufacturing, and maintenance. A design that looks satisfactory from a purely technical point of view may still fail in assembly logic, procurement feasibility, lifecycle cost, or serviceability. Educationally, this means that students should learn to treat requirement definition, concept selection, subsystem integration, and production planning as mutually shaping activities rather than isolated steps (Jamnia, 2016, 2023; Magleby et al., 1996; Todd et al., 1993).

Agile and iterative approaches reinforce this perspective. The literature on engineering design education suggests that recurrent review cycles, sprint-like planning, and visible task decomposition help students manage complexity and time pressure. These methods are not a substitute for rigorous engineering reasoning, but they can support it by creating a cadence of documentation, feedback, and revision. For an inter-course model positioned near the end of the curriculum, where students are expected to integrate prior knowledge and apply complementary concepts, such iteration is especially useful because students must repeatedly return to their assumptions after receiving input from another curricular perspective (Edwards, 2017; Jamnia, 2023).

2.3. Feedback, documentation, and experiential structuring

Integrated learning also requires integrated feedback. Research on peer assessment and engineering group work shows that structured rubrics, public review, and documented team processes can support both accountability and reflection. This is relevant at this point because the local pedagogical design did not rely only on the final report. It distributed evaluation across periodic presentations, peer questions, internal group roles, external review by other groups, and cumulative evidence kept in shared digital folders and minutes of the meetings (MoM) (Bailey, 2013; Tien, 2019; Shishavan & Jalili, 2020; Triantafyllou & Timcenko, 2014).

The pedagogical model also incorporates selected elements commonly associated with experiential and game-based learning approaches. It does not transform the courses into a full game. Nevertheless, recurring roles, bounded periodic challenges, visible artefacts, public comparison between groups, and documentary traces of progress create a structured experience in which engagement depends on iteration, communication, and progressive decision-making. These are not superficial motivational additions; they shape how students externalise and defend engineering reasoning (Ahmad, 2024; Bunt et al., 2024; Monteiro & Sousa, 2024).

2.4. Responsible use of generative AI in project-based engineering education

Generative artificial intelligence and large language models are increasingly relevant to engineering education because they can support ideation, documentation, visual communication, and early exploration of design alternatives. However, their pedagogical value depends on how they are introduced and controlled. In project-based learning, AI tools should not replace disciplinary reasoning, technical justification, creativity or engineering judgement. Instead, they can be used as complementary instruments that help students expand initial ideas, compare alternatives, improve communication artefacts, and reflect on the quality of their own decisions.

In the present pedagogical model, AI was therefore introduced as a supervised support tool rather than as an autonomous source of project solutions. This aimed to preserve human-led problem framing while also exposing students to the productive use of emerging digital tools in engineering work.

The use of AI was also extended to visual and communication tasks, such as early concept sketches, group logos, and scenario-based mock-ups of CAD concepts. These artefacts were not accepted as substitutes for technical drawings, CAD modelling, calculations, or manufacturability analysis. Instead, they were treated as complementary communication resources that could support concept explanation, stakeholder discussion, and project identity. The pedagogical emphasis was placed on critical use: students were required to explain the reasoning behind AI-supported outputs, identify sources and assumptions when relevant, and defend the technical content of their presentations during public discussion.

For example, the ALMA and EPAM groups used generative AI tools to create early concept images and scenario mock-ups for their weekly presentations, while IIP consultant groups used AI-generated images to illustrate possible production spaces, packaging, and layout concepts. These images supported communication and discussion, but the technical basis of the projects had to be provided through CAD models, calculations, decision matrices, bills of materials, routing proposals, and cost estimates. During presentations, students were required to distinguish between AI-supported visualisation and validated engineering content.

3. Methodology: qualitative descriptive case study

This study follows an implementation-oriented qualitative descriptive case-study design. The case is the consultancy-based inter-course intervention implemented during one semester between Introduction to Electromechanical Project (IEP), attended by students from Electromechanical Engineering (EME), and Introduction to Industrial Project (IIP), attended by students from Industrial Engineering and Management (IEM). The study combines documentary analysis (educational presentations and reports delivered throughout the semester) with descriptive analysis (anonymous student satisfaction questionnaire). This design allowed to document how the model was implemented and experienced.

3.1. Educational context

The pedagogical intervention was implemented during one semester in two 3rd-year undergraduate engineering courses, IEP and IIP at the University of Beira Interior. The intervention involved the voluntary participation of student groups organised around interdisciplinary project clusters. The documented intervention comprised two IEP groups, ALMA and EPAM, and six IIP consultant groups. Each IEP group was supported by three IIP groups. Therefore, the two IEP cases and six consultant groups analysed in the article represent the complete documented set of participating project clusters.

3.2. Pedagogical intervention

The pedagogical model was structured around consultancy-based interdisciplinary project-based learning. IEP students were responsible for the technical design and sizing

of electromechanical systems, while IIP students acted as industrial consultants responsible for production-process planning, manufacturability analysis, layout definition, logistics, quality control, and economic assessment.

The semester combined theoretical-practical classes dedicated to project-management concepts with practical tutorial classes centred on project development, periodic milestone presentations, and inter-group discussion. Periodic presentations followed the project Gantt schedule and were evaluated through professor assessment, peer assessment, and self-assessment.

3.3. Documentary sources

The model application adopts a documentary-analysis approach based on educational documents produced during the semester. The analysed sources included:

- (a) project briefs;
- (b) semester schedules;
- (c) periodic evaluation criteria;
- (d) student presentations produced by IEP groups;
- (e) consultant presentations produced by IIP groups;
- (f) MoM;
- (g) photographic records of mixed presentation sessions; and
- (h) questionnaire responses regarding student satisfaction with the pedagogical model.

These documents were selected because they provide evidence of project evolution, interdisciplinary interaction, decision-making processes, and industrial interpretation of technical concepts.

3.4. Analytical approach

The analysis focused on identifying how the consultancy-based structure influenced:

- (a) interdisciplinary interaction;
- (b) technical and industrial reasoning;
- (c) project evolution;
- (d) public communication;
- (e) collaborative problem-solving;
- (f) manufacturability awareness; and
- (g) systems thinking.

The study does not aim to establish causal educational effects through controlled experimentation. Instead, it documents and analyses the pedagogical architecture and its implementation through authentic educational evidence generated during the semester.

3.5. Ethical considerations

All students involved in the pedagogical intervention authorised the use of photographs, presentations, and project materials for academic and scientific dissemination purposes. No individual performance data are reported in this article. The questionnaire was

anonymous, participation was voluntary, and responses were analysed only in aggregated form. The authors were also involved as instructors and implementers of the pedagogical model. To mitigate the potential source of interpretative bias, the analysis relies on multiple documentary sources produced by students and anonymous aggregated questionnaire data. The photographs included in the manuscript were selected only from materials for which students had authorised academic and scientific use.

4. Local curricular context and project theme

The model application joined two 3rd-year undergraduate courses with complementary responsibilities. In IEP, students in EME were expected to define what the system should do and how it should function technically. In IIP, students in IEM were expected to define how that system should be produced, organised, quality-controlled, and industrially planned. This inter-course relationship was operationalised through the project clusters described in the Methodology section. Figure 1 shows the students and professors involved in implementing the pedagogical model. All students authorised the use of photographs and project materials for academic and scientific dissemination.



Figure 1. Students and professors involved in the application of the model proposal.

The semester project theme for the IEP students focused on peace and security. Students were challenged to design cost-effective, modular, dual-use (both civilian and military purposes) autonomous or remotely operated unmanned ground vehicles (UGVs), that is, rovers, for severe environments, using components and equipment made in Europe. The theme was intentionally broad enough to allow different technical interpretations, while sufficiently constrained to require electromechanical design, decision-making, production planning, quality control, and industrial organisation.

In parallel, the challenge for the IIP students was to design the production system required to manufacture the products proposed by the IEP groups. This involved the conception of modular, rapidly deployable, flexible, and compact production units or production plants capable of supporting decentralised manufacturing in operational

contexts. The IIP groups were expected to define suitable manufacturing and assembly processes, select machines and equipment, estimate energy and manpower requirements, assess sustainability and life-cycle implications, propose deployment and logistics methods, and calculate expected production outputs and costs. This complementary challenge ensured that each technical product concept was examined not only as an electromechanical system, but also as an industrial proposition with associated requirements for production feasibility, resource allocation, operational deployment, and manufacturability.

The project brief required students to define functional and operational requirements, study the market and compare alternative concepts, justify design decisions using formal methods, propose electrical and control architectures, and consider energy autonomy, electromagnetic compatibility, manufacturability, production feasibility, and cost-effectiveness. It also required a traceability chain from requirements to decisions and expected effects. This structure encouraged students to move beyond isolated prototype design and to consider future integration, production, maintenance, and operational use. Table 1 summarises the main documentary sources produced during the semester and used to support the analysis of the pedagogical intervention.

Table 1. Documentary sources prepared during the model application.

Document type	Evidence used in this article	Analytical purpose
Project brief and course slides	Semester theme, UGV brief, role structure, and schedule	Establish the intended pedagogical and technical design
Periodic evaluation criteria	Presentation requirements	Reconstruct milestone expectations and assessment logic
IEP presentations and MoM	Mobility-support rover concept, cost/specification iterations, documentation practices	Illustrate one pathway of project development under the brief
IIP consultant presentations	Three presentations linked to each IEP concepts	Document manufacturing, logistics, quality, equipment, and cost interpretations
Mixed-session photographic report	Photographs of IEP and IIP presentations during joint classes	Document the public, inter-course ecology in which concepts were defended and revised

The available documentary record included IEP and IIP presentations, MoM, and the semester photo-report. These sources do not constitute a complete outcome dataset for the whole semester. However, they are sufficiently rich to reconstruct how students interpreted the project brief, how their designs and industrial responses evolved, and how the pedagogical structure made the work publicly legible. Table 1 summarises the documents prepared by students throughout the semester.

5. Pedagogical architecture: semester design, milestones, documents, and consultancy logic

The periodic schedule converted a broad inter-course project into a sequence of bound design tasks. Early weeks focused on concept, market, team organisation, and project planning. Middle stages required three design versions, a complete assembly drawing, dimensioning work, command and power circuits. The final stages moved toward execution drawings, manufacturing processes, economic analysis, and final reporting.

Figure 2 shows the semester schedule used in both courses. The semester combines two complementary class formats. Theoretical-practical classes introduced project management concepts relevant to planning, coordination, and monitoring, while practical classes were dedicated to project development with tutoring. In those practical sessions, each group presented the periodic evolution of its project against the Gantt diagram, followed by a discussion of the different project options adopted by the groups. This alternation between conceptual framing and tutored project work helped students connect management tools with concrete engineering decisions. Additionally, groups evaluate other groups, and inside each group, students evaluate colleagues.

Assessment also followed a course-unit teaching-learning classification (CTC) that formally balanced test performance, project development, professionalism, and individual contribution within the group. Equation 1 shows the formula for calculating the CTC grade.

$$CTC = 0.9 \times [(0.25 \times TG) + (0.75 \times PG)] + PPV + PV \quad [1]$$

In this formula, TG is the test grade [0, 20], PG is the project grade [0, 20], PPV is a posture and professionalism value [0, 1], and PV is a performance value within the group [0, 1].

PG aggregated periodic project presentations with professor evaluation, evaluation by other groups, self-evaluation, and the final report, including the project specifications document and the project video. The periodic evaluation sheets clarified what counted as progress. In the opening stage, students were asked to propose a Gantt plan, identify the competencies of each team member, structure their digital dossier, define the concept clearly, identify target markets, estimate (broadly) costs and selling price, and present early evidence of external contact, and team building. In subsequent weeks, the criteria became more demanding: SWOT analysis, three project versions, weighted decision matrices, sketches, assembly drawings, subsystem dimensioning, instrumentation, control simulation, execution drawings, manufacturing processes, economic analysis, and draft video/report development. Thus, the assessment system made the semester legible as a cumulative engineering process rather than a series of disconnected presentations.

The consultancy-based relation with the IIP course was reinforced by cluster formation and by rubric items that explicitly required evidence of interaction with IEM groups. In other words, the inter-course relation was not left to goodwill alone; it was partially built into the semester schedule and the periodic public accountability structure.

Introduction to Electromechanical Project (IEP) presentations	Week01	Week02	Week03	Week04	Week05	Week06	Week07	Week08	Week09	Week10	Week11	Week12	Week13	Week14	Introduction to Industrial Project (IIP) presentations
Product + target market + Gantt plan + group organisation and organisation of the group folder in Microsoft Teams.	•	•													
Project specifications for three different versions of the project.			•												Presentation of the production process Selection of production equipment
Assembly drawing of one concept, supplier contacts. Alternative technical solutions for the same internal machine problem.				•											Presentation of product specifications, production process and production equipment
Justification of the contribution of each group member. Work progress (free topic on subsystems).					F	F	•								
Assembly drawing of the overall system, including mechanical and electrical elements.								•							Analysis and presentation of material flow Presentation of layout and implementation study
Mechanical sizing (kinematics and dynamics). Sizing of joining elements.									•						Presentation of the stock-control model Presentation of cost estimates and total cost
Design and simulation of control and power circuits. Control programs.										•					Presentation of industrial facility implementation, production model, stock control and cost estimate
Assembly drawing + final project specifications + production + manufacturing drawings of two parts + bill of materials + manufacturing processes											•				
Economic analysis + free topic on subsystems. Submission of the draft final report and project video												•			Presentation of the production and quality control model
Final presentation. Submission of the final report, specification document and project video													•	T	Final presentation
	■ IEP presentation	■ IEP + IIP presentation								F Holidays/public holidays				T Test	

Figure 2. Semester schedule used in IEP/IIP.

6. Results from documentary evidence

The documentary material from the IEP groups, ALMA and EPAM, provides evidence of the work developed and of how students engaged with the pedagogical structure. The two cases are useful because they exhibit different trajectories. The ALMA group developed the MobiKing concept, which stayed close to a field-support rover narrative aligned with the broad security frame of the brief, whereas EPAM developed the DuctRover concept, which progressively redirected its concept toward duct inspection, showing how students used the open structure of the semester to redefine a project in a more precise niche.

6.1. ALMA group: a mobility-support rover framed around field assistance - MobiKing

The group defined its concept, MobiKing, as a rover for military terrain support, with functions in reconnaissance, victim detection, and the transport of supplies, first-aid kits, and radios. The early presentations also included target segments such as the armed forces and civil protection, competitor references, an initial cost table, a selling-price estimate, a Gantt plan, team organisation, and external contacts. These elements suggest that the students quickly understood the performative logic of the periodic criteria: to be credible, the project had to be framed not only as a technical idea but also as an organised engineering initiative.

As the semester progressed, ALMA/MobiKing moved from a broad dual-use statement to more structured concept-development work. The group produced a SWOT analysis, a Why-Why chain focused on limited energy autonomy, three concept versions with differentiated materials and functionalities, and competitive comparisons against commercial systems. Added version-by-version specification tables and explicit competitor benchmarking were developed, indicating that students were beginning to transform a general idea into a comparative engineering proposition. The ALMA/MobiKing artefacts also show the influence of the semester criteria on student behaviour. The move toward three formal versions, the inclusion of competitor specifications side by side with local assumptions, and the explicit division of tasks by named team members all mirror the evaluative expectations of the periodic sheets. The project evolved towards a more detailed subsystem-level analysis.

Another point concerns the inter-course logic. ALMA/MobiKing's public presentations included evidence of team building with IIP groups and the periodic criteria explicitly required interaction with the cluster, as shown in Figure 3. Even when the technical work shown remained largely within the IEP domain, students were being socialised into an expectation that production, supply, maintenance, and quality would need to be discussed with another curricular community rather than imagined in isolation. By itself, this interaction extends learning beyond the scope of the IEP syllabus.



(a) Example of a periodic public presentation.



(b) Example of a team-building activity.

Figure 3. ALMA and its consultant groups' involvement.

Figure 4 shows the evolution of the CAD MobiKing rover concept and the computational tools used for mechanical analysis along the semester, considering Professors, stakeholders and other groups' suggestions.

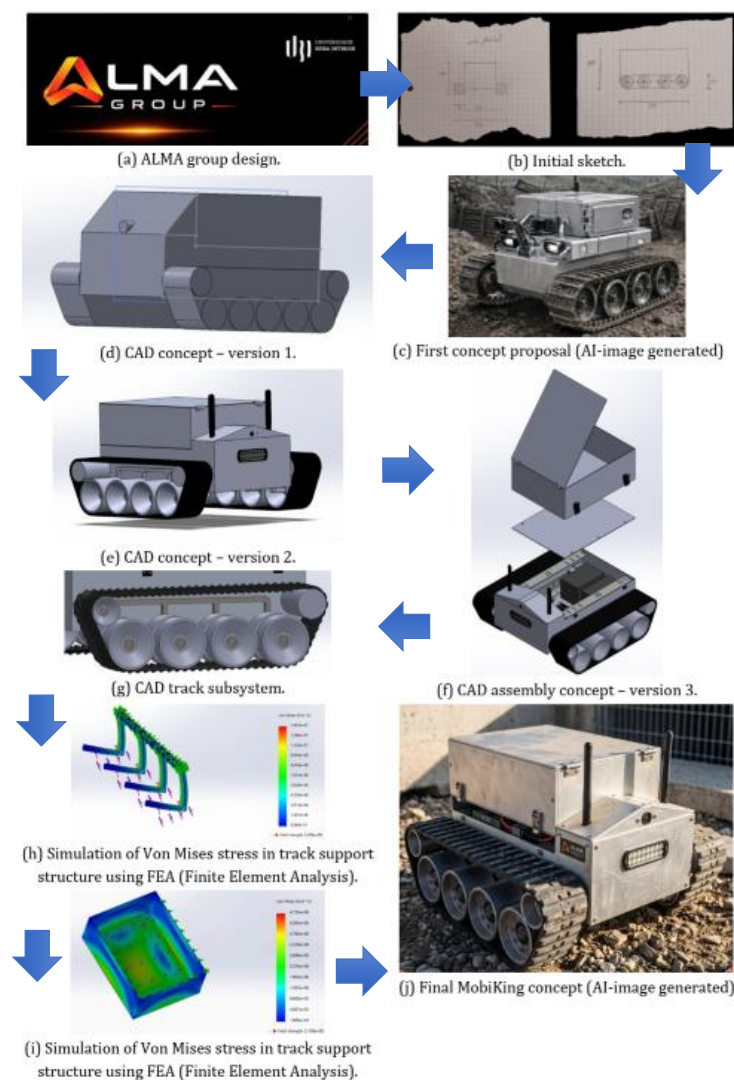


Figure 4. ALMA/MobiKing concept development.

6.2. EPAM: concept redirection and the emergence of DuctRover

EPAM group offers a particularly instructive case because it did not remain attached to its initial broad interpretation of the brief. In the first presentation, EPAM still framed the product as a general-purpose intelligent mobile platform capable of transporting materials and re-establishing communications in disaster-affected areas. This reading fit the original “peace and security” frame, and the group identified both civil and defense-related uses. However, in the following iterations, EPAM showed a deliberate concept-selection process in which several ideas were compared. The selected direction became a compact inspection robot for ventilation ducts, named DuctRover. In this sense, the dual-use orientation of the original brief was preserved. This redirection is pedagogically important. It shows that the course did not force students to remain locked into a first idea simply because it matched the generic project theme. Instead, the periodic structure rewarded increasingly specific design reasoning. Once the group identified inspection in confined spaces as a more coherent niche, the project acquired a clearer operational problem, a narrower target market, and more tractable technical questions concerning locomotion, size, communication, and energy autonomy.

EPAM’s next presentations make visible a rich technical decision process. The group identified a central problem around inspection inside confined conduits, listed geometric and operational limitations, differentiated functional, technical, and economic requirements, and generated three alternative configurations for locomotion. It then presented a weighted comparison and justified the selection of one version based on simplicity, adaptability, maintenance, and low cost. Thus, EPAM moved toward assembly-level reasoning. The group presented an overall assembly drawing, variants for an internal arm, a Duncker diagram, and a product tree.

That decision is itself educationally relevant: it indicates that the students were judging feasibility and scope, not simply accumulating tasks. In other words, the documentary record captures an important engineering lesson-knowing when a concept can be specified rigorously without overcommitting to construction.

The MoM reinforce the same picture. They first documented the moment of concept selection and the beginning of external contact with potential clients. Then, it records further clarification of technical requirements, work on the Gantt schedule, continuation of market research, online meetings for coordination, and team-building activity. Together, these records show how students inhabited the project not only as designers but also as coordinators, documenters, and prospective technical entrepreneurs.

The presentation also documented the cluster with IIP groups, which signals that the consultancy logic had become part of the project narrative. The public presentation and interaction with IIP consultant groups are shown in Figure 5.



(a) Example of a periodic public presentation.



(b) Example of a team-building activity.

Figure 5. EPAM and its consultant groups' involvement.

Figure 6 shows the evolution of the CAD DuctRover concept and the computational tools used for mechanical analysis throughout the semester, considering Professors, stakeholders and other groups' suggestions.

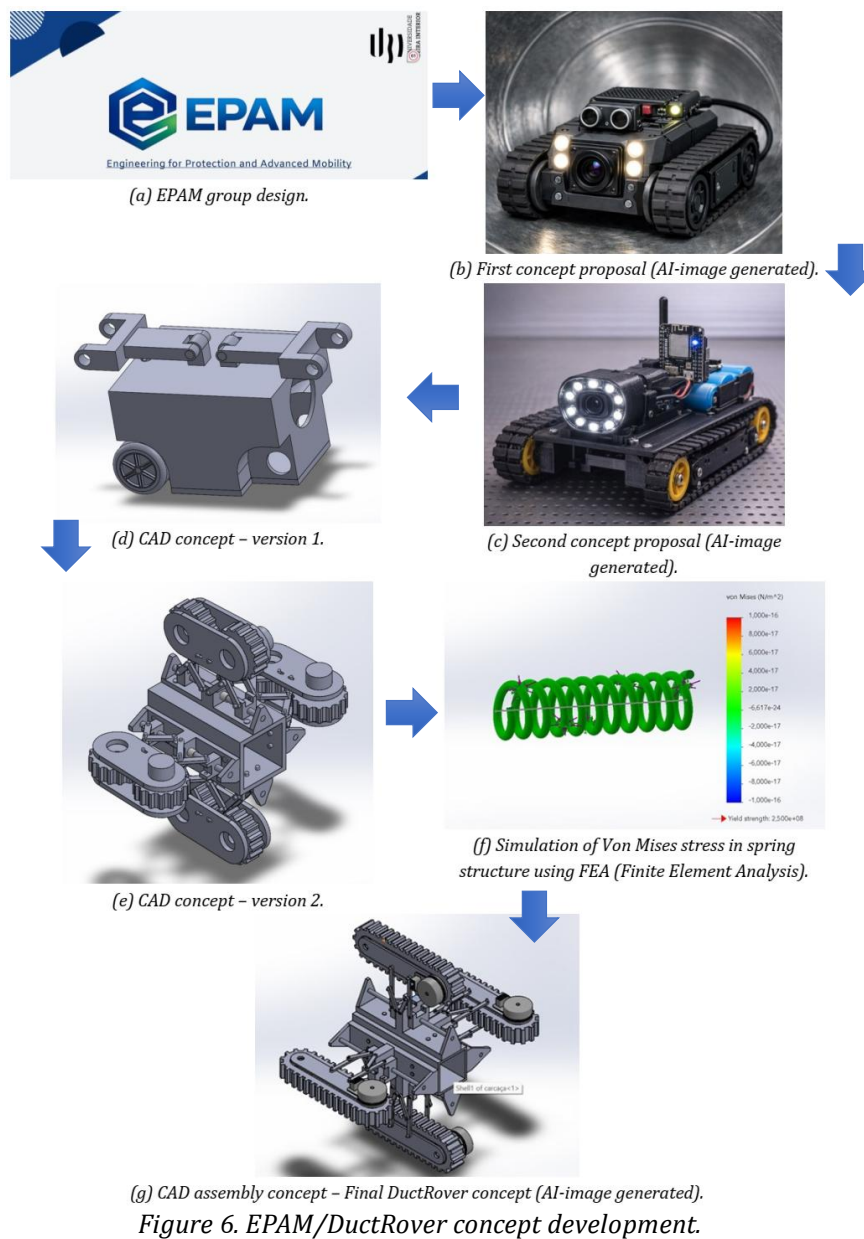


Figure 6. EPAM/DuctRover concept development.

6.3. Consultancy contributions from IIP student groups

The six IIP groups were distributed across the two IEP projects: AXIS, GPAC and MobileForge Robotics supported ALMA/MobiKing, while ATLAS 4, G4 and PolyCorte supported EPAM/DuctRover. The IIP consultant groups proposed production architectures, make-or-buy distributions, materials, equipment portfolios, quality checkpoints, timing estimates, bottleneck analyses, and amortisation scenarios tailored to the IEP concepts. In that sense, the consultants did not merely validate design ideas after the fact. They generated parallel industrial interpretations of those ideas and, in some cases, reframed what would count as a feasible product and production system.

6.3.1. Support to the ALMA group – MobiKing concept

The ALMA IEP group was supported by three IIP consultant groups: AXIS, GPAC, and MobileForge Robotics. Together, these groups translated the MobiKing rover from an electromechanical product concept into industrialisation scenarios involving production planning, logistics, quality control, manufacturability assessment, layout organisation, and economic analysis. This consultancy work is central to the inter-course pedagogical model because it demonstrates how IEM students applied industrial-engineering reasoning to a product under development by EME students.

AXIS group focused on decentralised and mobile production concepts for MobiKing. The group analysed how the rover could be manufactured or assembled near military, disaster-response, and civil-protection contexts through a mobile production unit. Their proposal included production-flow organisation, quality-control logic, layout planning, and support infrastructure for field production. The group also explored production-capacity estimation and proposed an indicative selling price of approximately €3,000/rover.

The GPAC group developed a complementary production-process analysis focused on manufacturability and process organisation. The group defined production routes, quality-control stages, production-flow diagrams, and assembly logic associated with the MobiKing chassis and cargo compartment. It also integrated technical specifications into the industrial plan and proposed recyclable packaging solutions. The estimated material and component cost was approximately €987/rover and a selling price of €2,000/rover. The production-capacity analysis estimated approximately 8 rovers/day.

MobileForge Robotics group proposed a containerised mobile-factory concept based on modular production units. The consultancy work included make-or-buy analysis, production-process organisation, material-flow analysis, transport considerations, packaging alternatives, and layout proposals. The estimated material and component cost was approximately €1,470/rover and a selling price of €4,500/rover. The production-capacity analysis estimated approximately 6 rovers/day.

Taken together, the three consultant groups illustrate how the consultancy-based structure expanded the ALMA/MobiKing project beyond technical design alone. The industrial-engineering students introduced manufacturability analysis, production

scalability, logistics, quality assurance, economic feasibility, and operational deployment considerations into the design discussion. Educationally, this interaction encouraged interdisciplinary communication, systems thinking, iterative decision-making, and earlier exposure to production-oriented constraints during the engineering-design process.

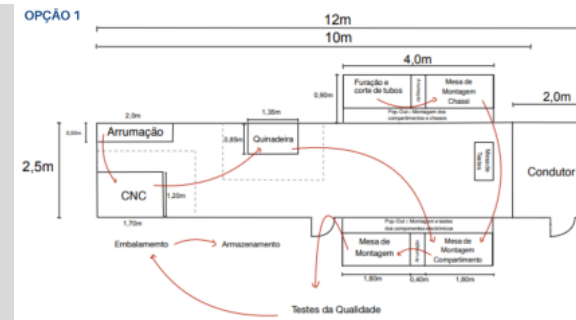
Figure 7 summarises representative industrial-engineering outputs developed by the consultant groups for the MobiKing concept.



(a1) AXIS presentation.



(a2) Truck com pop-outs



(a3) Production layout and flow.



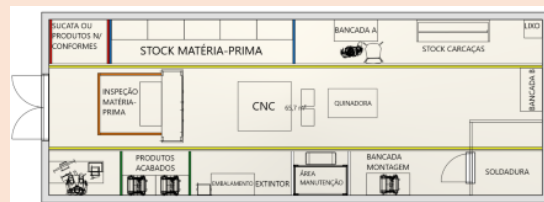
(a4) Packaging option.



(b1) Expandable trail.



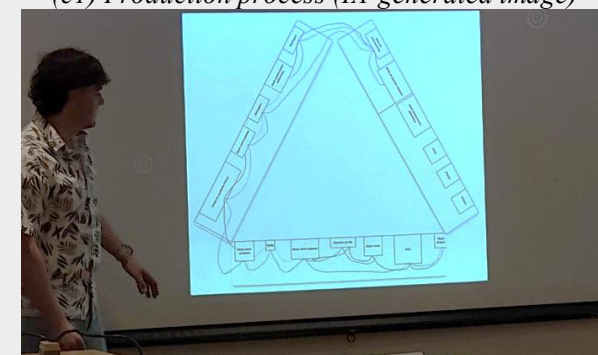
(c1) Production process (IA-generated image)



(b2) Production layout.



(b3) GPAC presentation.

(c2) Production layout and spaghetti diagram (3 connected containers)
(c) Industrial engineering proposal from MobileForge Robotics group.

(b) Industrial engineering proposal from the GPAC group.

Figure 7. Main outputs in terms of industrial engineering for the MobiKing concept from the three-consultant teams.

6.3.2. Support to EPAM group – DuctRover concept

The EPAM IEP group was supported by three IIP consultant groups: ATLAS 4, G4, and PolyCorte, each contributing to the industrialisation of the DuctRover concept from a different production-planning perspective. Together, the consultant groups translated the electromechanical design into manufacturing strategies, layout proposals, production-flow organisation, quality-control procedures, packaging concepts, stock-management approaches, and economic scenarios.

ATLAS 4 focused on the production-system architecture for DuctRover. The group developed process-flow proposals involving additive manufacturing, assembly, quality testing, packaging, and dispatch, together with layout and warehouse-organisation concepts. The consultancy work also included stock-control principles and production-capacity analysis. Their final economic scenario estimated a production cost of approximately €420/rover and a selling price of €1,200/rover.

G4 developed a complementary production and material-planning proposal. The group analysed the main structural, mobility, and electronic components of DuctRover and proposed a hybrid manufacturing approach combining composite manufacturing and additive manufacturing. The consultancy work also addressed sustainability-oriented packaging solutions, production planning, and material-cost analysis. Their final economic scenario estimated a production cost of approximately €767/rover and a selling price of €1,180/rover.

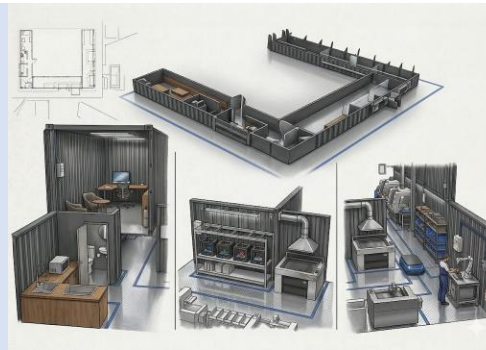
PolyCorte contributed a third industrialisation pathway focused on material selection, subtractive manufacturing, production layout based on mobile houses, warehouse organisation, and economic analysis. The group proposed CNC-based manufacturing approaches, modular production concepts, quality-control procedures, and stock-management strategies. The final economic analysis estimated a production capacity of approximately 18 rovers/day, with a variable production cost of approximately €942/rover and a proposed selling price of €2,250/rover.

Overall, the three consultant groups demonstrate how the consultancy-based model expanded the DuctRover concept beyond electromechanical design into industrial reasoning and manufacturability analysis. The interdisciplinary interaction exposed students to production planning, logistics, economic feasibility, material selection, quality control, and operational constraints during early design stages. Educationally, this interaction reinforced systems thinking, collaborative problem-solving, and the integration between technical and industrial perspectives.

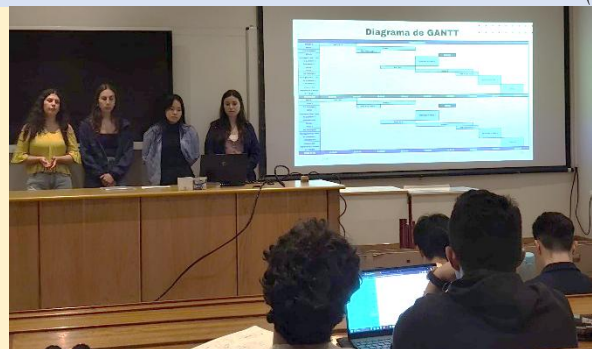
Figure 8 summarises representative industrial-engineering outputs developed by the consultant groups for the DuctRover concept.



(a1) ATLAS 4 presentation.

(a2) Production layout and common sections.
(a) Industrial engineering proposal from the ATLAS 4 group.

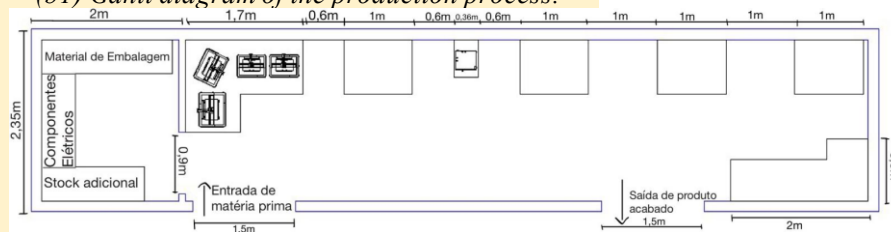
(a3) Raw material warehouse.



(b1) Gantt diagram of the production process.



(c1) Production layout.



(b2) Production layout and section.



(c2) Production layout.

(b) Industrial engineering proposal from the G4 group.

(c) Industrial engineering proposal from PolyCorte group.

Figure 8. Main outputs in terms of industrial engineering for the DuctRover concept from the three-consultant teams.

7. Results from the student questionnaire

To complement the documentary analysis, students were invited to complete an anonymous satisfaction questionnaire regarding the pedagogical model. The questionnaire included Likert-scale items related to course organisation, interdisciplinary interaction, project-based learning, tutorial support, public presentations, competency development, and overall satisfaction with the consultancy-based structure. The questionnaire was structured into six sections:

- (a) students characterisation;
- (b) course organisation and overall evaluation;
- (c) skills development;
- (d) interdisciplinary integration between IEP and IIP;
- (e) motivation and engagement; and
- (f) open qualitative feedback.

The student satisfaction questionnaire obtained 25 valid responses from a total of 32 students available to participate in the study, corresponding to a response rate of 78.1%. The global evaluation of the pedagogical model was favourable. 12.0% of students classified the model as “Very good”, 52.0% as “Good”, and 36.0% as “Satisfactory”. No students selected the categories “Weak” or “Very weak”. On a five-point ordinal scale, the global evaluation obtained a mean score of $M = 3.76$, with a median of 4 and a standard deviation of $SD = 0.66$. Details of the most relevant survey results are presented in Figure 9. The results show that the strongest dimension was “skills development” ($M = 4.30$; $SD = 0.66$), with 89.7% of responses in the categories “Strongly agree” or “Agree”. This dimension included particularly high ratings for problem-solving, technical communication, teamwork, and time-management. “Motivation and engagement” also obtained a strong result ($M = 4.15$; $SD = 0.71$), followed by “course organisation” ($M = 4.06$; $SD = 0.80$).

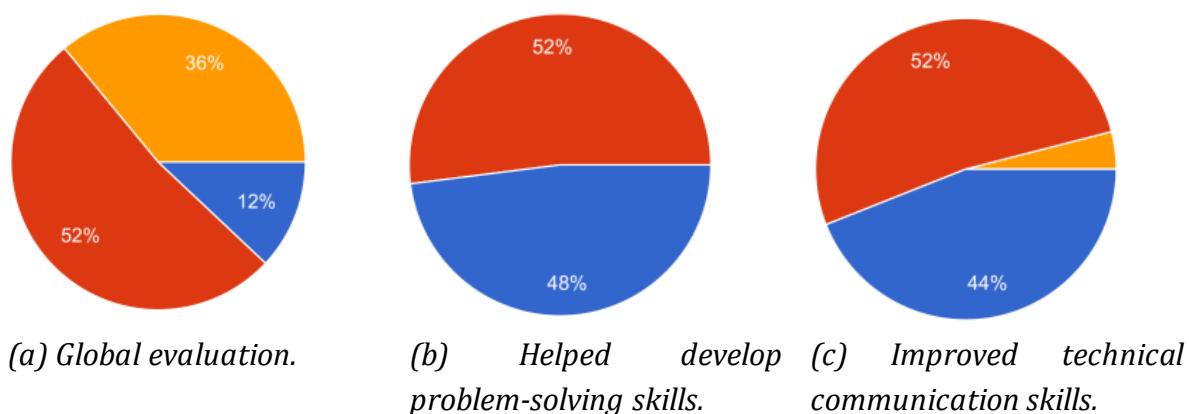


Figure 9. Questionnaire results related to global satisfaction and highly rated learning outcomes. Legend: Very Good: ■; Good: ■; Satisfactory: ■; Weak: ■; Very weak: ■.

As shown in Figure 10, the most moderate results were obtained for the “integration between IEP and IIP” dimension ($M = 3.58$; $SD = 1.02$). Although 58.0% of responses in

this dimension were positive, it also presented 25.3% neutral responses and 16.7% negative responses. This indicates that students recognised the educational value of the interdisciplinary model but also perceived operational difficulties in its implementation.

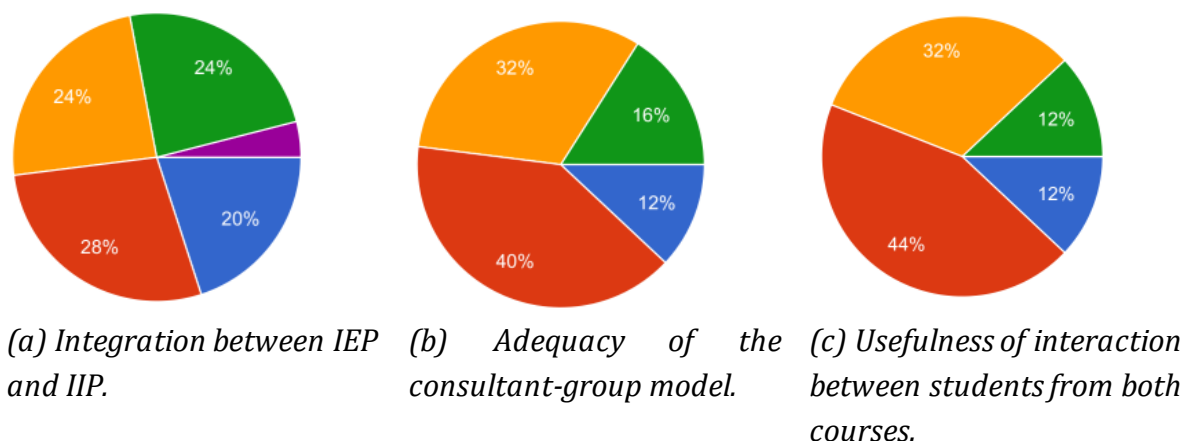


Figure 10. Questionnaire results related to challenges. Legend: Strongly agree: ■; Agree: ■; Neither agree nor disagree: ■; Disagree: ■; Strongly disagree: ■.

The open responses reinforce this interpretation. Representative critical comments illustrate these operational difficulties: one student referred to ‘difficulty of communication between courses’; another indicated that, for IIP students, ‘it would be simpler to have the product with the final specifications from the beginning’; and another suggested ‘fewer presentations and more classes to develop the project with teacher support’. These comments do not contradict the positive evaluation of the model but identify the scaffolding required for future iterations. The most frequently reported strengths were “interdisciplinarity”, “contact between students from different courses”, and “knowledge exchange”, representing 60.0% of the responses. However, the main difficulty was “communication and coordination between courses, groups, students, and teachers”, representing 56.0% of the responses. The main suggestions for improvement were to “reorganise the articulation between courses”, “provide clearer objectives and intermediate deadlines”, “increase tutored practical work”, and “reduce excessive presentation frequency” when it does not correspond to meaningful project progress.

8. Discussion

These results complement the documentary evidence by showing that students recognised the pedagogical value of the model, especially for skills development, teamwork, communication, and problem-solving. At the same time, the more moderate results for IEP–IIP integration confirm that interdisciplinary collaboration requires explicit coordination mechanisms, stable intermediate deliverables, and dedicated interaction moments. Therefore, the questionnaire does not merely validate the intervention. It also identifies operational conditions required for its improvement.

The documentary and questionnaire evidence supports six main claims about the pedagogical value of the intervention:

1. The semester architecture succeeded in converting broad course intentions into visible periodic engineering artefacts. The groups did not simply “work on the project”; they worked on bounded deliverables-concept slides, SWOT analyses, version tables, sketches, CAD assemblies, cost models, and MoM- which made progression discussable and assessable.
2. The inter-course consultancy logic was not marginal. It was embedded in the schedule and periodic rubrics through explicit references to the IEM cluster, which increased the likelihood that production thinking would enter the design conversation early.
3. The consultant groups did not simply react to finished concepts; they reformulated those concepts industrially through make-or-buy splits, equipment selection, mobile versus fixed production architectures, routing and timing tables, bottleneck identification, quality-test definitions, and amortisation scenarios. This suggests that the consultancy layer can function as a parallel industrial-design studio rather than as a lightweight feedback mechanism, provided that the consultant's work is visible early enough in the semester to influence the design conversation.
4. The supporting documents indicate that students did not merely accumulate slides; they learned to externalise engineering reasoning. SWOT analyses, Why-Why chains, version comparisons, competitive benchmarking, and early cost estimates are all imperfect but important transitional forms between intuition and engineering argument.
5. The two IEP groups demonstrate that the pedagogical model can accommodate distinct trajectories. ALMA elaborated a rover concept within the original field-support frame, whereas EPAM narrowed the problem and pivoted toward duct inspection. The model, therefore, seems compatible with both continuity and redirection if students can justify the change.
6. The documentary record suggests that cross-course consultancy benefits from a strong social infrastructure. Cluster-based interaction, evidence of team building, shared dossiers, role rotation, and public questioning all seem to matter because consultancy is not only an exchange of information; it is also a social permission structure that makes critique and reformulation normal. This resonates with broader literature on stakeholder integration, collaborative design, and participatory structuring in engineering and educational design (Howcroft et al., 2023; Savage et al., 2007).

The evidence also refines the relation between this practice and selected experiential and game-based design principles. Role rotation, bounded challenges, visible progress markers, and public comparison were useful only because they were tied to engineering work produced by students, documented reasoning, and public accountability.

9. Limitations

The study presents methodological limitations. First, it was implemented in a single institution and involved a limited number of student groups. Second, the study does not include a control group or longitudinal measurement of learning outcomes. Third, the evidence relies on documentary materials, student-produced documents, and perception data, which may not capture all learning processes. Fourth, the authors were also implementers of the model, although anonymous questionnaire data and multiple documentary sources were used to mitigate this limitation. Future work should incorporate interviews, competency rubrics, comparative designs, and longitudinal follow-up.

10. Conclusions

This article presents a consultancy-based inter-course model linking technical design and production planning in engineering education and documents its semester implementation through a project brief, a milestone schedule, periodic rubrics, IEP student presentations, IIP consultant presentations, MoM, and a photographic record of mixed sessions. The combined evidence from IEP and IIP consultant groups shows that students used this structure to define concepts, compare alternatives, contact stakeholders, organise work, and progressively transform initial ideas into more explicit technical and industrial propositions.

The study does not claim to measure learning gains causally. It documents how the model was implemented, evidenced through student artefacts, and perceived by participants.

The semester evidence suggests that the educational strength of the model lies in its documentary, iterative, and dialogic character. Students were not only asked to design. They were asked to explain, justify, compare, schedule, record, and expose their decisions to peers and to another curricular community. Meanwhile, the IIP consultant groups were asked to reinterpret the same products through routes, equipment, costs, layouts, testing stages, and decentralised-production concepts. This produced a richer form of project learning in which technical and industrial reasoning could begin to meet before the final stage of the work.

The results indicate that consultancy-based interdisciplinary project-based learning supports a stronger integration between technical design and industrial reasoning. The interaction between IEP and IIP students promoted systems thinking, structured decision-making, and the articulation of design choices with manufacturability, logistics, quality control, and economic feasibility. The use of periodic milestone presentations, documented project evolution, and inter-group consultancy reinforced accountability, communication, and iterative refinement of engineering solutions. Evidence from project documents and student perception data suggests that this model enhances engagement and aligns learning activities with professional engineering practice.

The study contributes an implementation-oriented pedagogical framework for inter-course collaboration in engineering education, demonstrating how complementary disciplinary roles can be structured to reflect real-world product development processes. The results support the integration of technical and industrial perspectives within undergraduate curricula and highlight the value of project documents, as real as possible, as sources of educational evidence. While the findings are context-dependent, the proposed model provides a transferable reference for programs seeking to strengthen interdisciplinarity, applied learning, and the connection between design and production.

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AI use statement

AI-assisted tools were used to support language revision and translation during the manuscript preparation. Within the pedagogical framework, students were allowed to use generative AI only as a supervised support for early ideation, visual mock-ups, and group identity elements. AI-generated outputs were not accepted as substitutes for CAD modelling, engineering calculations, technical drawings, manufacturability analysis, or design justification.

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Appendix A

Student Satisfaction Questionnaire on the Pedagogical Model

Introduction to Electromechanical Project (IEP) / Introduction to Industrial Project (IIP)

Background

This questionnaire aims to evaluate students' perceptions of the interdisciplinary pedagogical model implemented in the course units Introduction to Electromechanical Project (IEP) and Introduction to Industrial Project (IIP).

The model is based on project-based learning, development of real projects in groups, periodic presentations, interaction between students from different degree programmes, continuous tutorial support, and integration between technical design and industrial planning.

Responses are anonymous and are used exclusively to improve the teaching and learning process.

Section A — Student Characterisation

A1. Degree programme

() Electromechanical Engineering (IEP)

() Industrial Engineering and Management (IIP)

A2. Group

Section B — Overall Evaluation and Open Feedback

B1. How do you globally evaluate the pedagogical model implemented? (Response scale: 1 - Very poor; 2 - Poor; 3 - Satisfactory; 4 - Good; 5 - Very good): ____

B2. What do you consider to be the main strength of the pedagogical model? (maximum: 20 words)

B3. What do you consider to be the main difficulty encountered? (maximum: 20 words)

B4. What suggestions do you have to improve the course unit? (maximum: 20 words)

Section C — Course Organisation

Response scale: 1 – Strongly disagree; 2 – Disagree; 3 – Neither agree nor disagree; 4 – Agree; 5 – Strongly agree

- C1. Was the weekly organisation of activities adequate? ____
- C2. The project schedule helped monitor the development of the work? ____
- C3. The periodic presentations contributed to keeping the group focused on the objectives? ____
- C4. Was the tutorial support during practical classes useful? ____
- C5. Was the workload adequate for the objectives of the course unit? ____
- C6. Were the assessment criteria clear? ____
- C7. Did the assessment method adequately reflect the work to be developed? ____

Section D — Skills Development

Response scale: 1 – Strongly disagree 2 – Disagree 3 – Neither agree nor disagree 4 – Agree 5 – Strongly agree

- D1. The project contributed to improving teamwork skills? ____
- D2. The project contributed to improving technical communication skills? ____
- D3. The pedagogical model helped develop problem-solving skills? ____
- D4. The project contributed to improving time-management and task-management skills? ____
- D5. The project allowed theoretical knowledge to be applied in practical situations? ____
- D6. The periodic presentations helped develop argumentation and technical-defence skills? ____
- D7. The project contributed to increasing autonomy in learning? ____

Section E — Integration between IEP and IIP

Response scale: 1 – Strongly disagree 2 – Disagree 3 – Neither agree nor disagree 4 – Agree 5 – Strongly agree

- E1. Was the interaction between students from both degree programmes useful? ____
- E2. Collaboration between groups helped improve understanding of the relationship between technical design and industrial production? ____
- E3. Was the consultant-group model adequate? ____
- E4. Were the contributions from groups in the other degree programme relevant to project development? ____
- E5. The interdisciplinary model brought the project closer to real engineering practice? ____
- E6. Should the integration between IEP and IIP continue in future academic years? ____

Section F — Motivation and Engagement

Response scale: 1 – Strongly disagree 2 – Disagree 3 – Neither agree nor disagree 4 – Agree 5 – Strongly agree

F1. Did the pedagogical model increase motivation to learn? ____

F2. Did the development of a real project make learning more interesting? ____

F3. Did the public presentations increase engagement with the course unit? ____

F4. Was the work developed more stimulating than traditional methodologies? ____

F5. Do I recommend this pedagogical model for future editions of the course unit? ____

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Pedagogical Co-Design as a Tool for Integrating Learning: An Exploratory Case Study in a Master's Programme in French as a Foreign Language

Krassimira LACOUSTETE*, Géraldine LARGUIER**

Abstract

This article presents an exploratory case study of pedagogical co-design in a Master's programme in French as a Foreign Language (FFL) at the University of Pau and Pays de l'Adour, France. The device articulates two course units - Project Approach and Instructional Design and Integration of Digital Tools-around a shared authentic Learning and Assessment Situation (LAS): the design of a hybrid course on the Moodle platform. Grounded in the competency-based approach and mobilising project-based pedagogy, blended learning and Universal Design for Learning, it aims to develop in students an integrated vision of pedagogical design that articulates theory and practice, pedagogical engineering and digital-tool use. We define pedagogical co-design as the collaborative process through which two teachers jointly design an integrated device across their respective courses while engaging students as co-designers of the final artefact, and we situate it within the literature on co-creation and collaborative curriculum-making in higher education. The device was implemented and refined over two successive iterations (2024–2025, collaborative; 2025–2026, individual). Data were collected through three questionnaires-two standardised institutional course evaluations and one researcher-designed questionnaire - combining four-point Likert items, categorical items and open-ended responses, analysed through descriptive statistics and thematic analysis. Findings indicate high student satisfaction, positive engagement fostered by continuous assessment, and a recurrent tension between conceptual input and hands-on practice. Most importantly, students voice an explicit demand for greater curricular coherence, echoed by the coexistence of two non-harmonised assessment grids. The study contributes a two-level account of pedagogical co-design and identifies the collaborative construction of a shared assessment grid as the decisive threshold for integrating learning across articulated courses.

Keywords: competency-based approach; pedagogical co-design; project-based learning; blended learning; digital accessibility

* Deputy Director of the Pedagogical Support Department, University of Pau and Pays de l'Adour, krassimira.lacoustete@univ-pau.fr

** Director of the French Studies Institute for Foreign Students, University of Pau and Pays de l'Adour, geraldine.larguier@univ-pau.fr



1. Introduction

Contemporary transformations in higher education are profoundly reshaping training modalities. The adoption of the Bachelor–Master–Doctorate system and the progressive institutionalisation of the competency-based approach (CBA) have brought significant changes to the design of university curricula. Yet these reforms have not systematically improved the pedagogical coherence experienced by students, and programme-level coherence remains a recognised challenge in the higher education literature (Villarroel et al., 2018).

In many university programmes, students may perceive their courses as fragmented: content is addressed in compartmentalised ways, links between disciplines remain implicit, and the articulation between theory and professional practice can be difficult to perceive. Such fragmentation constitutes an obstacle to learning integration and, consequently, to the development of complex professional competencies (Tardif, 2006). While these observations are widely shared among practitioners, they call for context-specific inquiry rather than general assertion, which is the purpose of the present study.

It is in this context that a device of pedagogical co-design was designed, implemented and studied, articulating two courses of the Master's FFL programme at the University of Pau and Pays de l'Adour (UPPA): Project Approach and Instructional Design and Integration of Digital Tools. The initiative rests on several complementary principles: the competency-based approach, project-based pedagogy, the creation of an authentic Learning and Assessment Situation (LAS), and a concern for digital accessibility and inclusion.

This exploratory case study addresses three research questions. **RQ1:** How does the co-design of two articulated courses around a shared authentic LAS influence Master's FFL students' perception of curricular coherence? **RQ2:** To what extent does the shared LAS support the integration of pedagogical and digital competencies, as perceived by students and evidenced in their productions? **RQ3:** What tensions and conditions of transferability emerge from implementing pedagogical co-design across two distinct course units?

Accordingly, the study pursues three objectives: to describe a pedagogical co-design device articulating two courses around a shared authentic task; to analyse students' perceptions of coherence and competency integration; and to identify the limitations and transferable conditions of such a device. Given its exploratory and descriptive nature, the study does not test predefined hypotheses but is guided by two working propositions: that articulating the two courses around a shared LAS would strengthen students' perceived coherence and render the integration of pedagogical and digital competencies more visible to learners.

2. Theoretical Background

2.1 Defining Pedagogical Co-Design

Although widely used, the notion of co-design covers distinct realities in higher education and therefore requires explicit definition. The literature on co-creation defines it as staff and students working collaboratively to create components of curricula and/or pedagogical approaches (Bovill et al., 2016), a strand rooted in students-as-partners scholarship (Mercer-Mapstone et al., 2017; Bovill et al., 2011). More broadly, co-design designates a collaborative, iterative process in which multiple stakeholders-teachers, students, educational developers, technologists-jointly design, prototype and evaluate educational solutions such as courses, tools or curricula.

In this article, pedagogical co-design refers specifically to the collaborative process through which two teachers jointly design an integrated learning and assessment device across their respective course units-negotiating objectives, activities, resources and assessment criteria around a single authentic task-while engaging students as co-designers of the final hybrid-course artefact. Distinguishing these two levels (teacher-teacher co-design of the device and teacher-student co-design of the artefact) is analytically important: it locates the present contribution within collaborative curriculum-making rather than within student-staff co-creation alone, and it frames the central question of coherence as an effect of teacher-level articulation.

2.2 The Competency-Based Approach: Institutionalisation and Debates

The competency-based approach (CBA) has progressively become established in the European higher education landscape following the Bologna Process (1999) and OECD recommendations for structuring training around competency blocks. In France, this institutionalisation materialised through the decree of 30 July 2018, modifying the decree of 22 January 2014, which prescribes the organisation of training around competency blocks for bachelor's, professional bachelor's, and master's degrees.

The adoption of CBA has not, however, been consensual. In France notably, several academics have voiced reservations, highlighting risks of utilitarian logic, forced implementation, and persistent conceptual ambiguity surrounding the notion of competency (Chauvigné & Coulet, 2010). Despite these reservations, when collectively elaborated, CBA offers a relevant framework for articulating theory and practice, disciplinary knowledge and professional contexts (Poumay & Georges, 2022). A consensual definition has progressively coalesced around the notion of 'complex know-how-to-act' (Tardif, 2006; Georges & Poumay, 2020): competency mobilises not only knowledge but also the capacity to deploy it in an integrated, adapted and reflexive manner in varied and complex contexts. This conception directly motivates the search for pedagogical devices-such as the one studied here-that make the integrated mobilisation of competencies both possible and visible.

2.3 Project-Based Pedagogy as a Learning Lever

Project-based learning stands out as a particularly relevant experiential method for translating CBA intentions into concrete practice (Bédard et al., 2012). It is a contextualised, learner-centred and generally multidisciplinary method that emphasises learning transfer by placing students before complex, authentic challenges to be resolved collectively, mobilising research, critical analysis and collaboration competencies. Recent meta-analytic evidence associates project-based learning with positive effects on student learning and engagement across disciplines (Zhang & Ma, 2023), while also underlining that these effects depend on careful scaffolding and assessment design—a caveat directly relevant to the device studied here.

A structuring element of project-based pedagogy lies in the production of a concrete final artefact—report, design plan, prototype or model—intended to be presented to the class or to an external audience (Krajcik & Blumenfeld, 2006). This production gives meaning to learning and creates a form of authenticity that motivates learners. It also constitutes an ideal anchoring point for competency assessment: by observing how students accomplish a complex, authentic task, one can access the integrated mobilisation of competencies, including its cognitive and conceptual dimensions, which often remain tacit (Tourmen, 2015).

2.4 The Learning and Assessment Situation and Authentic Assessment

The Learning and Assessment Situation (LAS), known under various names (integrative activities, authentic tasks), is defined as a complex situation, experienced in a learning context and representative of common professional situations that the novice professional must be able to manage (Heinen & Lemenu, 2015). Its defining feature is authenticity: the situation should resemble as closely as possible the everyday reality of the future professional. This principle converges with the international literature on authentic assessment, which argues that assessment should replicate the cognitive and contextual demands of real-world practice (Villarroel et al., 2018) and should be conceived as preparation for work, well-being and society rather than as mere measurement (McArthur, 2023).

Through the LAS, students mobilise and combine internal and external resources (knowledge, skills, attitudes) and learn to position themselves relative to their objectives, whether by self-assessing or by drawing on the perspectives of teachers, experts and peers (Georges & Poumay, 2020). The LAS thus does not limit itself to assessing declarative knowledge but targets the integrated mobilisation of competencies in a complex situation; Tourmen (2015), drawing on Vergnaud (2001), stresses the importance of 'descending to the cognitive'—analysing the conceptualisations and action schemes that structure activity. Contemporary work further reframes authentic assessment as a lever for inclusion, arguing that authentic, flexible tasks can widen access and reduce assessment bias (Tai et al., 2023; Nieminen et al., 2023), and systematic evidence links authentic assessment to improved learning experience and employability

(Sokhanvar et al., 2021). Connecting these strands, the LAS operates as an operational bridge between theoretical CBA, project-based pedagogy and authentic assessment, and it is precisely this articulation-rather than any single concept-that the co-design device seeks to realise.

3. The Pedagogical Device: Designing a Hybrid Course

3.1 Context and Objectives

The LAS, titled 'Design of Hybrid Pedagogical Sequences', requires students to design a two-week hybrid course, transforming a traditional teaching unit into a blended one. The device spans two articulated units of the master's FFL curriculum, whose volumes differ: one comprises twelve hours of seminars and six hours of autonomous work, the other ten hours. The device rests on two complementary frameworks: the ADDIE model (Analysis, Design, Development, Implementation, Evaluation), which methodologically structures the students' design process; and pedagogical alignment (Lebrun, 2005), which ensures coherence between learning objectives, activities, resources and assessment. It also involves a reasoned selection of digital tools and resources, each student or group producing a syllabus detailing objectives, activities, assessment modalities and mobilised resources. Blended learning is understood here not as the mere juxtaposition of face-to-face and online components but as their pedagogical integration, a distinction repeatedly emphasised in the blended-learning literature (Rasheed et al., 2020).

3.2 Fundamental Characteristics of the LAS

Professional authenticity. The project places students in a situation close to their future professional activity; the final product-a complete hybrid course-is a pedagogical artefact potentially reusable in a real context.

Cognitive complexity. The project simultaneously mobilises pedagogical, technical, organisational and collaborative competencies, requiring students to articulate pedagogical reflection, technical design and project management.

Integration of learning. The LAS articulates pedagogical engineering and digital-tool integration through the design of Moodle activities and the use of multimedia and interactive resources, countering the fragmentation of teaching by offering an integrated vision of pedagogical design and creating an operational bridge between theoretical frameworks and their concrete implementation.

Collaboration. In its first iteration the project was conducted in groups, promoting collaborative learning: students negotiated their choices, argued their decisions and collectively constructed a coherent approach (see Section 4.1 on the subsequent shift to an individual task).

3.3 Pedagogical Architecture and Technical Modalities

The hybrid course designed by students typically extends over two to three weeks and alternates face-to-face time and remote activities. Each unit must include explicit learning objectives, a detailed pedagogical scenario, articulated face-to-face and remote activities,

at least one comprehension activity conducted remotely, and interactive autonomous activities. Courses are developed on Moodle with the integration of H5P activities and varied multimedia resources. Deliverables include a syllabus, a pedagogical scenario, a Moodle sequence with interactive activities, and an oral presentation.

3.4 Digital Accessibility and Universal Design for Learning

Accessibility is envisioned as an essential pedagogical and ethical dimension of the device, embedded in a progression developed throughout the semester. Students are introduced to pedagogical alignment and to accounting for learner diversity, and dedicated activities on the accessibility of digital resources help them identify obstacles likely to limit access to learning. These outcomes are then mobilised in the LAS through the application of Universal Design for Learning (UDL) principles: multiple means of representation, of action and expression, and of engagement. The aim is not to design a perfectly accessible device but to lead future teachers to integrate accessibility from the earliest stages of pedagogical design—an orientation consistent with evidence on the effectiveness of UDL (Almeqdad et al., 2023) and with broader accounts of inclusive pedagogy in higher education (Stentiford & Koutsouris, 2021). In the present device, accessibility functions primarily as a formative design intention rather than as a graded criterion (see Section 4.2).

3.5 Hybridisation and Learning Spaces

Hybrid devices require reflection on the organisation of physical and digital spaces. Within the UNITA alliance and in partnership with national higher-education improvement projects, several active-pedagogy rooms were equipped at UPPA to promote collaborative, hybrid and flexible learning. Sharing such a room for the two courses was a key success factor: modular furniture and shared technologies facilitated the negotiation of pedagogical choices and the co-construction of the final artefact, and the spatial configuration attenuated the boundary between the two courses, strengthening the perception of a single integrated project. Such environments combine spatial flexibility, integrated technology, inclusive accessibility and pedagogical support, becoming a catalyst for the student engagement and practical application that learners expect.

4. Methodology

4.1 Research Design, Context and Participants

This study adopts an exploratory, descriptive case-study design (Yin, 2018), suited to investigating a pedagogical innovation in its authentic institutional context with small, purposively defined populations. The case is a co-design device articulating two Master's course units around a shared authentic task, studied across two successive iterations: a first iteration (2024–2025) in which the project was carried out collectively, and a second iteration (2025–2026) in which it was redesigned as an individual task. This iterative

implementation reflects a design-based logic of progressive refinement, the evaluation of the first iteration informing the redesign of the second.

The device was implemented at UPPA, in the second year (M2) of the Master's programme in French as a Foreign Language, across two semester-9 course units: *Démarche de projet* (Project Approach and Instructional Design) and *Intégration des outils numériques* (Integration of Digital Tools). Each cohort comprised approximately twenty students. In the first iteration (2024–2025), students worked in four to five project groups (collective project); in the second iteration (2025–2026), the culminating task was completed individually. Data were collected from both cohorts, as detailed below.

4.2 The Assessed Task and Assessment Modalities

In the individual iteration, within the shared task, each student designed a hybrid teaching unit targeting CEFR level A2: a two-week unit (one hour at a distance, two hours face-to-face) with an explicit title and objectives, a table sorting activities into face-to-face and autonomous, at least one distance reading- or listening-comprehension activity, and interactive autonomous activities (for example self-paced grammar or lexical practice), deposited on the Moodle (Elearn) platform.

Reflecting the co-design across two course units, each of the two teachers assessed students' productions with her own criterion-referenced grid, the two grids not yet being harmonised. In the *Integration of Digital Tools* course, the grid (out of 16) weighted the overall scenarisation of the unit for a hybrid course (/4), the ergonomics and clarity of the activity descriptions (/4), the transformation of autonomous activities into appropriate interactive activities (/6), in-course participation (/2). In the *Project Approach and Instructional Design* course, the grid (out of 10) rated fourteen finer-grained criteria: adherence to the announced schedule and sequencing, welcome and closing messages, SMART objectives, constructive alignment, Moodle configuration, interactivity, an assessment quiz, forum and communication, variety of resources, creativity, originality, writing quality, and a task-tracking trace. The coexistence of two separate grids concretely illustrates the study's central tension: although the two courses are co-designed around a shared task, their assessment is not yet harmonised (see Section 7). It is worth noting that constructive alignment is an explicitly graded criterion, whereas accessibility remains a formative design intention rather than a scored one.

4.3 Data Collection, Analysis and Ethics

To document students' perceptions, the study triangulates three questionnaires across the two iterations. In the first iteration (2024–2025), two standardised institutional course-evaluation questionnaires (administered by the UPPA Evaluation Office in June 2025) were used, one per course unit (*Project Approach and Instructional Design*, $n = 10$; *Integration of Digital Tools*, $n = 11$). These instruments combine four-point Likert items (1 = not at all to 4 = completely), categorical items (perceived level, pace, online resources, continuous-assessment experience) and three open-ended questions. In the

second iteration (2025–2026), a researcher-designed questionnaire focusing on the integrated unit was delivered via Moodle (December 2025–January 2026, $n = 5$), combining categorical items (general interest, importance for training, balance of theory and practice, distance/face-to-face alternation) and open-ended items.

Two of the three instruments are therefore institutional satisfaction questionnaires not specifically designed for this study; they capture perceived satisfaction and clarity rather than competency gains. This constraint, addressed in Section 4.4, motivates the triangulation with the researcher-designed questionnaire and with students' open-ended comments.

Closed and categorical items were analysed using descriptive statistics (means, frequencies, percentages). Open-ended responses were analysed through thematic analysis (Braun & Clarke, 2006), using inductive coding to identify recurrent themes, which were then triangulated across the three sources to strengthen interpretive validity.

The institutional course evaluations were collected anonymously under the university's standard evaluation procedure. For the researcher-designed questionnaire, administered via the course's Moodle space, students were informed orally in class of its purpose before responding; because the platform recorded respondents' identities, all responses were pseudonymised prior to analysis and no identifying information is reported. Participation was voluntary.

4.4 Limitations

Several limitations constrain this study: small, non-aggregable samples ($n = 5$; 10; 11), instruments measuring satisfaction rather than competency integration, lack of a comparison group, and a shift from collective to individual tasks between iterations. While the findings are consistent, they remain context-specific and not generalisable.

5. Results

Results are reported in three movements: quantitative findings drawn from the first iteration's institutional course evaluations (Section 5.1); qualitative findings, namely the theory–practice tension identified in the second iteration and the demand for coherence recurring across both cohorts (Section 5.2); and a concluding synthesis (Section 5.3).

5.1 Satisfaction, Clarity and Engagement

Across both institutional evaluations, students reported high overall satisfaction (mean = 3.8/4 for Project Approach and Instructional Design, $n = 10$; 3.6/4 for Integration of Digital Tools, $n = 11$) and rated learning objectives and assessment rules as clear (3.6–3.8/4). For Project Approach and Instructional Design, 80% of respondents gave the highest satisfaction rating and 90% considered the course level appropriate; figures for Integration of Digital Tools were comparable (level appropriate: 90.9%). Online resources were judged satisfactory by all respondents in both courses (100%).

Among students concerned by integral continuous assessment, perceptions were very positive: respondents agreed that the frequency of assessment was appropriate and

that continuous assessment fostered both their investment in the course and their success (means of 4.0/4 for Project Approach and Instructional Design, $n = 4$; 3.8/4 for Integration of Digital Tools, $n = 5$). These items provide an indication-rather than a direct measure-of the behavioural and cognitive dimensions of engagement (Fredricks et al., 2004).

5.2 Theory–Practice Tension and Demand for Coherence

In the second iteration, both closed and open data reveal a consistent tension between conceptual input and hands-on activity. Three of five respondents judged the integrated unit 'too theoretical', while the remaining two found it 'balanced'. Open-ended comments repeatedly expressed a wish for more practice and content creation: students valued theoretical inputs such as project-management tools as useful for their forthcoming internship, yet wished to engage further in the actual creation of pedagogical content. Tellingly, the tools mentioned as difficult (Gantt charts, H5P, Moodle configuration, writing learning outcomes) were also those students most wished to develop further, suggesting productive difficulty rather than rejection.

The strongest qualitative signal, recurring across both cohorts, concerns curricular coherence. Students praised the professional relevance of the device, the direct manipulation of tools, group work (described as very useful for the future), and the teaching team's field experience and support. At the same time, several comments pointed to fragmentation: an imbalance in workload across projects and groups, and instructions for the main projects that would have gained from being more clearly stated. Most tellingly, one respondent described the project course as disconnected from the rest of the programme and called for the teaching team to ensure it is better integrated into the curriculum. This explicit demand for integration directly echoes the rationale of the co-design device.

5.3 Synthesis

Taken together, the sources converge on two findings that hold across both iterations. First, students express strong appreciation for the integrated, professionalising and hands-on character of the device, and for continuous assessment as a driver of involvement. Second, they articulate a clear demand for greater coherence-across the two courses, in workload distribution and in the clarity of project expectations-together with a recurring call for more practice relative to theory. These results are consistent with the literature on project-based and authentic learning while highlighting integration, not motivation, as the principal lever still to be strengthened.

6. Discussion

6.1 Transformations in Teaching Practices

The implementation of the LAS transformed teaching postures, marking a shift from a content-delivery model to a function of piloting learning. Teachers progressively adopted a posture of support and scaffolding rather than top-down transmission, placing students

at the centre of the construction of their know-how-to-act. This support materialised through exploratory questioning aimed at making solutions emerge from students; moments of co-regulation during group work, allowing real-time adjustment; spaces for collective reflexivity on mobilised action schemes; and a valorisation of the right to error, treating experimentation during Moodle configuration or accessibility implementation as essential learning opportunities. This evolution created a climate of trust conducive to iterative revision, and it underscores that co-design concerns not only content but also the way teachers and learners collaborate—an interpretation consistent with accounts of co-creation as relational and process-oriented (Bovill et al., 2016).

6.2 Authenticity, Assessment and the Limits of the Device

A quality LAS requires attention to two criteria: complexity and authenticity. In this case both are satisfied: students simultaneously mobilise pedagogical theory, technological competence and collaborative competencies, and designing a hybrid course is a genuine task of future teachers. Yet the results locate the principal limit not in motivation but in assessment. The theory–practice tension reported by students (Section 5.2) resonates with the authentic-assessment literature, which insists that perceived authenticity depends on an appropriate balance between conceptual input and productive activity (Villarroel et al., 2018; McArthur, 2023). More decisively, the demand for coherence (Section 5.2) can be read, through the lens of collaborative curriculum-making, as a call for articulation at the level of the teachers themselves: coherence is produced less by the shared student project than by the alignment of the two teachers' objectives, criteria and assessment. The coexistence of two non-harmonised grids is the concrete expression of this unfinished articulation.

A further limitation concerns the nature of the evidence. Because two of the three instruments are institutional satisfaction questionnaires, the study documents perceptions and satisfaction rather than measured competency gains; integrated competency development is inferred from students' artefacts and comments rather than assessed directly. Future work should therefore complement perception data with analysis of the artefacts themselves, using a shared rubric, so as to evidence competency integration more directly.

7. Conclusions and Perspectives

This exploratory case study suggests that pedagogical co-design articulated around an authentic LAS can strengthen students' perceived coherence and engagement, while making visible the conditions under which learning integration is-or is not-achieved. Across two iterations, students valued the integrated, professionalising and hands-on character of the device and the continuous-assessment regime, yet consistently called for greater coherence between the two courses.

A central lesson concerns assessment. While the two courses now share a common authentic task, they still rely on separate assessment grids, reflecting the same fragmentation the co-design process aims to overcome. The next critical step is to

collaboratively develop a shared assessment framework that aligns evaluation criteria across both courses. This would not only address students' demand for coherence but also enhance the visibility of transversal competencies and strengthen assessment equity. In our view, this transition from co-designed tasks to co-designed assessment marks the decisive threshold of pedagogical co-design.

A second perspective concerns the progressive and critical integration of generative artificial intelligence, which students could use to create linguistic activities, generate supports, adapt content to different difficulty levels or analyse written productions. The objective would not be merely to introduce tools but to train future teachers in their critical, ethical and reflective use within pedagogical design.

These findings unfold in a particularly favourable context - an involved teaching team, motivated Master's students and adequate digital resources-conditions that are not always met. Nonetheless, the principles implemented here (pedagogical co-design, production of authentic artefacts, and reflexive, inclusive assessment) are transferable and adaptable to other contexts and disciplines. The study thus illustrates how universities can create complex, authentic and transformative learning environments in which theory and practice articulate, and it identifies the shared assessment grid as the concrete next step toward integrating learning across articulated courses.

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Integrating Green Citizenship in Higher Education Curricula: The Case of a Transversal and Interdisciplinary Course on Environmental Communication and Sustainability

Adina BAYA*, Corina TURȘIE**

Abstract

The increasing urgency of addressing environmental challenges and the vital role of higher education in cultivating active green citizenship represent two key arguments supporting the necessity of innovative curriculum approaches with broad student accessibility. Across the globe, leading international organizations have emphasized the critical importance of environmental education as a fundamental driver for achieving sustainable development, going beyond specialized courses to become a transversal component of university curricula. However, many higher education institutions still lack accessible and interdisciplinary course offerings that address green citizenship in a competence-based and practice-oriented approach, especially for students from varied educational backgrounds. Our paper presents a case study of the design, implementation, and evaluation of a transversal university course that responds directly to this gap, aimed at cultivating green citizenship among students across all faculties from the West University of Timișoara, Romania. The course is aligned with international commitments such as the UN's 2030 Agenda, aiming to develop environmentally conscious graduates prepared to engage critically in ecological and civic challenges. Drawing on an interdisciplinary pedagogical framework that combines communication science—particularly media literacy and media content production—with environmental science, the course integrates theoretical knowledge with practical applications. Social media platforms are employed as a key pedagogical tool, enabling experiential learning through content creation, public engagement, and critical reflection on digital environmental communication. The course aims to empower students to better understand the urgent challenges currently facing the environment, as well as to equip them with the necessary skills to become proactive in addressing them.

Keywords: green citizenship; environmental communication; social media; environmental education.

* Phd Lecturer, West University of Timișoara, Romania, adina.baya@e-uyt.ro

** Phd Lecturer, West University of Timișoara, Romania, corina.tursie@e-uyt.ro



1. Introduction

Higher education institutions from all over the world face the challenge of offering the practical competencies needed to address the environmental emergencies facing our planet, while leading international organizations such as UNESCO, United Nations (UN), and the European Union (EU) advocate for integrating environmental education as a transversal component of the curricula, addressing wide student audiences in an accessible way. However, conventional teaching programs often lag behind and fail to attract students from diverse specializations and remain relevant. In order to meet the growing demand for fostering green citizenship – built at the intersection of environmental awareness, commitment to a sustainable lifestyle and civic engagement to address ecological crises –, universities must adopt innovative pedagogical strategies that are connected to the societal transformations that contemporary students will need to face. Moreover, effective environmental communication must reach beyond echo chambers and engage a broad range of student audiences, including those who specialize in domains that have no connection to the topic. As specialists present at a panel discussion at the International Journalism Festival highlight, “we have to make content for people we don’t make content for.” (IJF, 2023). In other words, universities are confronted with a pressing responsibility to equip their students with the ability to present complex environmental issues in an informed, relatable, and persuasive way through accessible platforms that reach wide audiences.

The present study asks how universities can integrate green citizenship into higher education curricula through an accessible course that uses digital and social media tools to strengthen environmental awareness, critical evaluation, and sustainable action. To address this question, we present the detailed case study analysis of a pioneering transversal and interdisciplinary course designed to meet this demand. Combining theoretical and practical perspectives from communication science – particularly media content production techniques and media literacy – and environmental science, the course aims to empower students to better understand the urgent challenges currently facing the environment, as well as equip them with the necessary skills for becoming proactive in approaching them. In order to achieve its aims, the course provides practical knowledge and case studies that inspire and motivate students, as well as a best-practices guide including interviews with specialists from local initiatives dealing with environmental problems. Structured in five interdisciplinary modules, with each containing a section of “knowledge” (theoretical data), “inspiration” (case studies) and “action” (practical assignments), the course stimulates personal agency in approaching environmental problems and a solutions-oriented approach, equipping students with the necessary skills for communicating effectively, persuasively and accurately on digital platforms about environmental topics. More specifically, we present a case study of using social media for teaching environmental communication, drawing on existing literature on the topic and connecting it with research on green citizenship. By using a focus group discussion and a student survey in the curriculum design phase of the project, as well as

a survey applied to graduates after the course's first year of implementation, our research provides a detailed description of how the course was created, as well as of its implementation and outcome. Developed as part of an Erasmus+ project bringing together higher education specialists in communication and environmental science from Romania, Hungary, Estonia and Lithuania, the course we describe in this in-depth case study links academic knowledge with real-world data and hands-on assignments, thus preparing students to successfully contribute to sustainability discourses developed across the different professional contexts they are part of, and become informed advocates of environmental protection while actively practicing green citizenship.

2. Green citizenship and its role in higher education

Situated at the intersection between environmentalism and citizenship theories, the concept of green citizenship combines environmental awareness, democratic participation, and the everyday practice of sustainable living. This perspective extends the liberal understanding of citizenship based on individual freedoms and rights to emphasize the individual duty to protect the environment through concrete and innovative solutions to global challenges (UNESCO, n.d.). Scholars highlight that this form of citizenship is twofold: first of all, it is practical, as manifested in daily routines related to behaviors such as recycling and waste management, using sustainable means of transportation, paying attention to resource conservation, or embracing green consumption; secondly, it is political, including environmental activism, which may involve membership in NGOs, protesting, or attending demonstrations (Stern, 2000). The political dimension of green citizenship is particularly relevant in the context of accelerating climate change and resource depletion, which require citizens to act as "critical agents of change" (UN, 2015) in line with the UN' Sustainable Development Goals.

In contemporary debates, there are various concepts closely related to green citizenship, such as "ecological", "sustainability", or "environmental citizenship" (ENEC, 2018), in the general effort of "greening" citizenship (Dean, 2001; Machin & Tan, 2024). Environmental citizenship stresses the ethical, civic, and behavioral dimensions of environmental action. It implies "the responsible pro-environmental behavior of citizens who act and participate in society as agents of change in the private and public sphere, on a local, national and global scale, through individual and collective actions, in the direction of solving contemporary environmental problems, preventing the creation of new environmental problems, achieving sustainability as well as developing a healthy relationship with nature" (ENEC, 2018). To clarify the added value of these similar terms, the following distinction can be made: while "environmental citizenship" highlights the civic duty to the environment, "sustainable citizenship" focuses on long-term planetary health, and the more general term "green citizenship" combines these perspectives, emphasizing everyday, actionable steps and broader democratic engagement (ENEC, 2018).

Increasing global environmental challenges and their consequences, such as climate change, extreme weather events, biodiversity crises, species extinctions, or the pollution of natural resources and health crises, have led to an increased importance of green citizenship. These challenges do not only require political decisions and business innovations, but also grassroots behavioral change.

Critical studies argue that the limits of neoliberalism could be dealt with the help of green citizenship, anchored in democratic norms and practices (Macgregor, 2016), aiming to overcome unsustainable development. The perspective of individuals acting as environmental stewards, assuming their ecological rights and duties, virtues and practices (Machin & Tan, 2024) makes citizens accountable for behaviors directly influencing ecosystems. On the other hand, it was argued that the ecosystems where citizens live explicitly shape the content of green citizenship, perceived as a lived practice grounded in local spatial realities (Wood & Kallio, 2019). Practices of “greening everyday life” (Meyer and Kersten, 2016), such as “attention to urban biodiversity, (...) community gardens and farmers’ markets, bicycling and automobility” (Meyer and Kersten, 2016) become manifestations of green citizenship.

UNESCO’s agenda on education for sustainable development (2025) considers that universities’ role is to teach students to make informed decisions and take action to solve problems. When it comes to environmental problems, their transversal character – meaning they are deeply interconnected with social, cultural, economic, and political issues – makes them even more challenging to solve. In this context, higher education should enable citizens to critically assess these connections and to act accordingly.

The practice of green citizenship requires a sense of agency. Research shows that individuals who perceive themselves as capable of contributing to environmental solutions are more likely to adopt sustainable behaviors and engage in collective action (Brereton, 2022). In this context, empowerment through education is particularly relevant for younger generations of future citizens (Hadjichambis & Paraskeva-Hadjichambi, 2020), who often experience climate anxiety yet may lack personal agency or opportunities to turn their concerns into action.

For youngsters, social media enables new places for action and new forms of civic engagement, from sharing environmental information to mobilizing communities. The case of Greta Thunberg, now a globally recognized environmental activist who founded Fridays for Future, a youth-led movement advocating for policies to tackle climate change, is often cited. This digital layer of participation is particularly relevant for younger generations, whose active citizenship identities are shaped by participation in such youth movements (Huttunen & Albrecht, 2021). Moreover, if one core characteristic of green citizenship practices is “critical acting” (Machin & Tan, 2024, p.11) expressed through participation in decision-making processes, then digital tools offer accessible platforms for environmental expression, activism, and community building. Digital skills can serve as “smart tools”, transforming students’ ecological knowledge into agency (Nemet-allah et al. 2026), thus narrowing the gap, documented in scientific literature,

between environmental knowledge and environmental behaviour (van de Wetering et al., 2022). Through integrating training for digital skills and environmental knowledge, our approach intends to cultivate climate and digital literate citizens, capable of meaningful actions to support sustainability.

Academic literature on environmental education presents environmental citizenship in close connection with global citizenship (Misiaszek, 2015; Moreno-Fernandez & Navarro-Diaz, 2015; Nascimento & Reis, 2025), both concepts emphasizing the importance of citizens' responsibility for sustainable development. According to UNESCO, global citizenship education "aims to empower learners to engage and assume active roles, both locally and globally, to face and resolve global challenges" (UNESCO, 2014, p.15), a vision that aligns directly with the participatory dimension of green citizenship. Universities can contribute to preparing students as "agents of change" by equipping them with the knowledge, skills, and attitudes needed to engage critically with environmental issues.

3. Teaching environmental communication through social media

Several studies from the academic literature, as well as policy and strategic reports, examine the challenges faced by environmental education. First and foremost, they identify structural obstacles, referring to the marginal integration of environmental issues within formal curricula (UNESCO, 2021). Given that environmental education is still considered rather new and peripheral curricular content in many universities, it lacks reflection on effective pedagogical teaching and evaluation approaches and on teacher training programs (Zhang et al., 2025; UNESCO, 2021). Such approaches should take into consideration the importance of cultural and motivational barriers, as students may struggle to connect abstract environmental concepts to their everyday lives or feel overwhelmed and experience anxiety due to the magnitude, urgency, and complexity of global ecological problems (Goldman et al., 2020; Jensen & Schnack, 1997). Furthermore, educators struggle both to keep up with creating a curricular content able to address relevant needs and interests, amid ever-growing ecological challenges (Hudson, 2001), and with pedagogical strategies such as "the use of information and communication technologies and social media" (UNESCO, 2014, p.10). They require new forms of environmental communication literacy (Lindenfeld et al., 2012), including social media (Talib, 2018; Portman et al., 2025). Teaching students how to critically assess environmental content online and how to produce it themselves is, therefore, central to preparing them for active ecological citizenship and "greenfluencing" in a digital society (Turşie & Baya, 2025). However, research also shows that environmental topics are frequently addressed superficially, as part of poorly designed programs that fail to develop the interdisciplinary approaches needed for sustainability-oriented thinking (Auñón, 2024).

International organizations and institutions such as UNESCO and the European Commission advocate innovative, interdisciplinary approaches using up-to-date digital

tools for environmental education, supporting the idea that environmental education must go beyond specialized courses and should be integrated transversally into the curricula. Moreover, the European Commission advocates for “green skills” (Bianchi et al., 2022) to be integrated into the learning outcomes developed in education.

Taking into account existing research on the topic, the current paper aims to answer the following research question: “How can universities integrate green citizenship into higher education curricula through a widely accessible course that leverages digital and social media tools to enhance appeal, impact, and skill development in environmental awareness, critical evaluation, and sustainable action?”.

Our research tackles this question through a case study of a transversal course implemented at the West University of Timisoara (WUT), offering several innovative perspectives on teaching environmental communication to Gen Z students. First of all, the course has an interdisciplinary approach. Keeping in mind that digital technologies increasingly mediate green citizenship and social media platforms have become key spaces where environmental narratives circulate, communities mobilize, and young people develop civic identities, we designed an original educational venue at the intersection between environmental and communication studies. Secondly, the course has an innovative pedagogical approach. It is focused on competence-based learning and combines theoretical elements from the fields of communication studies (with a particular focus on digital media literacy and media content production skills) and environmental studies, connecting theory with real-world examples and including a best-practices guide with detailed descriptions and interviews with specialists on implementing local environmental communication campaigns. This approach aligns with WUT’s student-centered teaching and learning approach (Ilie et al., 2020), i.e., the reflective-collaborative model that emphasizes the importance of designing teaching experiences that enable students to achieve authentic learning goals, connected to real-life problems. Thirdly, the course has a multidisciplinary addressability, being conceived as an elective transversal course, available to students from all university specializations and rewarded with 2 ECTS.

The proposed case study is a higher education course that promotes ecological and communication literacy, digital communication skills, and a sense of agency for learners in addressing environmental challenges. It is an attempt to make environmental education more accessible, enjoyable, and transformative for contemporary learners.

4. Methodology

The current article employs a case study methodology to explore the integration of green citizenship into higher education curricula through an innovative transversal and interdisciplinary course centered on environmental communication and sustainability. The course creation was part of an Erasmus+ project entitled “GreenCool - Let me influence your green self!” (n. 2021-1-HU01-KA220-HED-000027563), in which WUT

partnered with universities in Hungary, Estonia, and Lithuania, aiming to develop a course that encourages students to become proactive content creators of environmental messages on social media platforms. While the course was initially grounded in the Erasmus+ project and benefits from its multinational perspective in the curriculum design phase, the current study uses evidence exclusively from its implementation and outcome in Romania, at WUT, with the purpose of providing an in-depth case study. Comparative perspectives on connected topics included in the project can be found in separate studies employing multinational student cohorts (Kővári et al., 2023; Banász et al., 2026).

In the curriculum design stage, we developed both qualitative and quantitative research. We started with an initial phase of desktop research, in which we gathered up-to-date information on current trends in environmental pedagogy and on assessing Gen Z's attitudes and behaviors regarding the environment. Afterward, we organized a focus group discussion with 8 university students. The students were selected using an open call disseminated in WUT, inviting participants who comply with two criteria: demography - only students of 18-25 years old were selected; and social media interests - micro-influencers and opinion leaders were particularly welcomed. As a result, the focus group was composed by students with various fields of study (communication, journalism, psychology, digital media, political science and geography), having prior experience in extracurricular activities involving face to face or online communication and influencing (such as volunteering, publishing a student magazine, or being active members of student associations) and they were knowledgeable social media consumers and digital creators, each with relevant experience in these areas. All the participants were invited to sign an informed consent form, acknowledging the fact that their name could appear for identification purposes only in the interview transcript, but it will not be presented in the reports, that the interview was recorded for research purposes only and that the focus group interview was being processed as research work and they could request to read it before being published. The focus group discussion was facilitated by two WUT researchers, who steered the discussion through the five parts of the focus group guide, accounting for a total of 95 minutes: introduction and warm-up, communication and influencing techniques, green issues, green attitudes and conclusions. The discussions allowed a better understanding of how students' social media consumption habits (*What channels of communication do you use the most in your activities? / What type of techniques do you use to impact your group/followers?*) connect with their environmental attitudes (*How do you see the transition to becoming green among youth? Do you see any (attitude) changes? Do you think there is a "dark side" of greening? Are there any debates of this type that come to your mind? Please give us examples of critical points of view on green issues.*), and how they perceive online opinion leaders who promote environmental awareness and a sustainable lifestyle, also known as "greenfluencers" (*Do you follow green influencers online? Which ones?*). The focus group also helped us calibrate a survey that we subsequently applied to primarily to assess their

perceptions and practices regarding green social media content, environmental awareness, and attitudes. The questionnaire, that took 10 minutes to complete, was applied in Timisoara (Romania) to students from universities and high-schools, aged 14-25, as part of several educational events. A computer assisted data collection (CAPI) method was carried out via the online QuestionPro platform. All survey participants were assured about the anonymity of their answers, they were informed about their right to end the completion of the questionnaire at any time and about the aggregate character of published data.

The survey's 395 responses were useful in designing the course's curriculum to meet students' expectations and needs. The data was analyzed with SPSS. The data presented in this paper resulted from frequency analysis of the responses on two sections of the questionnaire, regarding social media consumption (*How much time do you spend online using social media platforms per day?*) and green issues (*How interested are you in the following environmental topics? - Reducing food waste; Recycling; Green transport (public transport, scooter, e-car); Green festivals (e.g. returnable glass); Giving up packaging; Water saving; Energy saving; Protecting nature; Protecting the climate; Waste management (e.g. separate collection); Low waste lifestyle; Sustainable fashion; The downside of green initiatives-pollution scandals*), with answers using 1-4 Likert scales.

Consequently, the course was developed by an interdisciplinary team of experts in environmental and communication sciences who participated in the Erasmus+ project. Finally, after the course's first year of implementation, we applied a survey to a different, smaller cohort consisting of 35 students who enrolled and completed the course, to gather feedback and assess what teaching tools were most effective and how we can improve the course in the following year. The survey required 5 minutes to be completed and had two parts (Figure 3): a general one, investigating students' perception of the convergence between the course and the teaching philosophy of the university and on the appropriateness of the course's length and pace, and a part dedicated to questions regarding the learning experience. Using 1-5 Likert scales, students had to assess the relevance of the content (*Content was relevant to me*), of the teaching and learning methods (*"Action" clearly connected to the "Knowledge" and "Inspiration" parts/Tests, activities supplemented the training well/Offered opportunities for practice, collaboration, and application*), of the efficacy of learning (*Feel confident coupling green topics with communication methods*), of the Moodle platform experience (*Clearly organised in Moodle platform/Moodle platform was attractive for the learner*) and of the course's perceived utility (*The course is a much needed cross-curriculum course*). In the end, an open-ended question allowed students to make final evaluative remarks on the course.

5. Case study: A transversal course intersecting environmental and communication science

Several studies in recent years have advocated the need for teaching environmental communication using innovative approaches and connecting it with other areas of media education (Milstein et al., 2017; Brereton, 2022). Social media in particular can serve as a pedagogical tool for fostering the critical thinking tools students need in the digital world, since “environmental communications and extensive new online forms of media literacy can be harnessed at all levels of the educational spectrum, as students and educators strive to promote innovative online learning” (Brereton, 2022, p. 187).

5.1. Curriculum design & syllabus creation

The learning objectives of the course took into account recent works on environmental communication pedagogy and the need to focus on aspects such as “teaching basic [...] concepts of sustainable development”, “teaching about the planet (especially with regard to air and soil)” and “waste recycling management”, with particular attention granted to “campaigning around the environment and using interactive techniques”, as students were encouraged to become proactive creators of social media content dealing with environmental issues (Sharifi et al. 2019, quoted in Brereton, 2022, p. 187-188). Moreover, our objectives took into account the generally positive results of studies that analyze learning mediated by technological tools, referring to their use as “motivational, promoting joy and interest” among students (Viteri, 2021). In addition, we added a reflective and collaborative component in the curriculum design process – in line with WUT’s approach to teaching and learning (Ilie et al., 2020): the course involved developing content for a collaborative Instagram account, allowing students to engage with real digital platform audiences, a type of teaching process shown to “bring [the] definition of environmental communication to life” (Cruger, 2017, p. 364). Teamwork for creating digital content also encouraged students to “build from their experience with consumption of mediated messages about the environment”, while critically assessing and filtering such content in order to become “constructors of [their own] environmental messages” (Cruger, 2017, p. 364). Finally, we decided the course will also teach students storytelling techniques for developing digital content, starting from the idea that “storytelling and ‘restorying’ can play a critical role in the transformation of learners regarding environmental concerns”, because “stories not only teach us how to act – they *inspire* us to act” (Pileggi & Morgan, 2017, p. 227), as well as a section dedicated to the ethical aspects of social media communication and recognizing misinformation.

The course offered an extensive list of environmental topics students could choose from (e.g. tips for leading a sustainable lifestyle, documenting local environmental initiatives, recycling and upcycling benefits, the consequences of irresponsible consumption connected to fast fashion etc.), as well as a wide range of possible formats for presenting the data in an attractive, well-documented and meaningful way, so as to fit the expectations of social media platform audiences (e.g. tutorials, testimonials, image-

driven presentations structured as “pecha kucha” or elevator pitch speeches, interviews with local green campaign organizers / NGOs, journalistic reports from events that had a strong environmental component etc.). The overall aim of offering this wide array of choices was to encourage students to find a topic that particularly fits their interests, but also allow them to get acquainted with topics outside this sphere, thus “developing positive sensitivity for issues and discourses” connected to the environment, while proactively approaching them in the social media content they produce (Brereton, 2022, p. 188).

Throughout the curriculum design process and later while creating course materials, we kept in mind that “emotions remain a powerful source of behavior and cognition” (Brereton, 2022, p. 188) and that several studies attest Gen Z’s tendency to predominantly consume “visually and sonically pleasing content dripping with (authentic) personality” from social media over predominantly informative one from legacy media (Oliver Wyman Forum, 2023). We also took into account that the focus groups discussion and the subsequent survey we applied showed most of our students spend significant amounts of time on social media everyday (43% spend 1-3 hours, and 37,5% spend 4-6 hours), particularly on Instagram (according to over 80% of respondents), and they tend to have an interest in generic environmental issues, rather than concrete ones. The largest majority chose “nature protection” as their green interest, rather than specific topics such as “reducing food waste”, “recycling” or “green transport”.

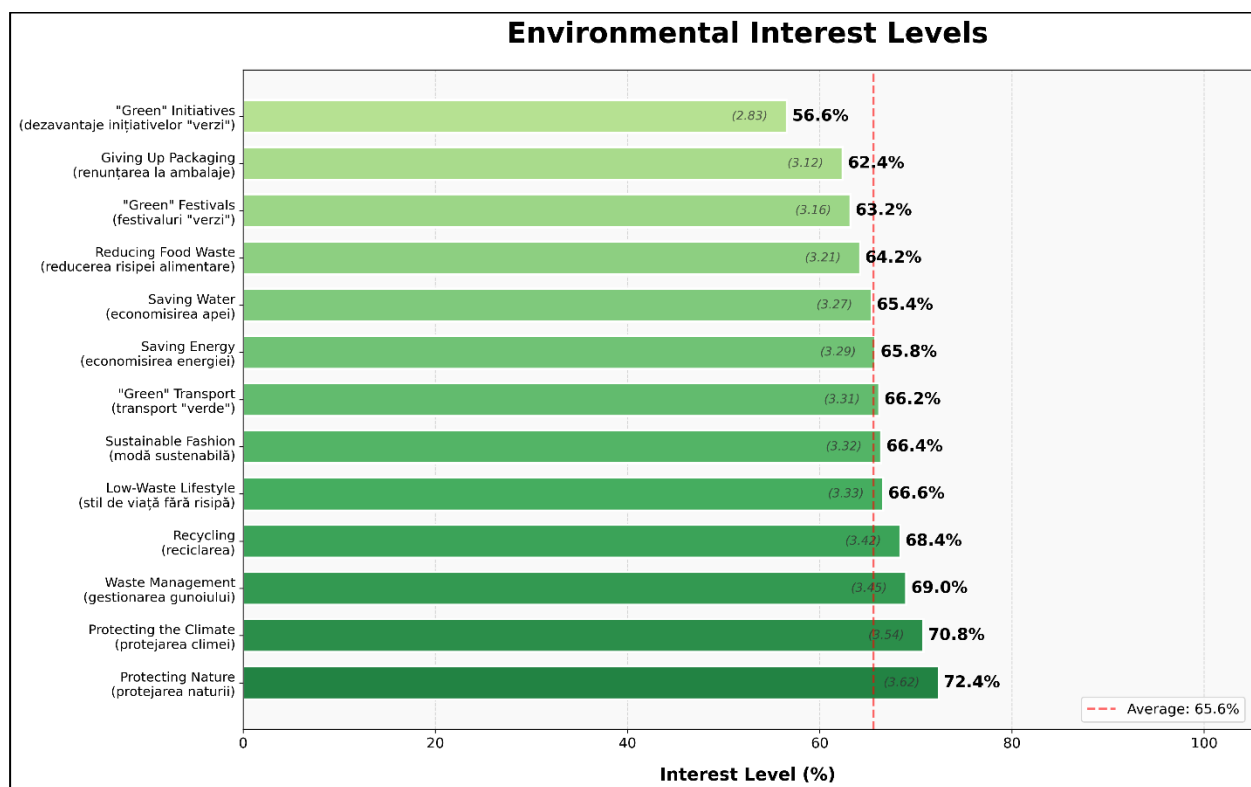


Figure 1. Excerpt from the pre-implementation survey assessing students’ interest in environmental issues (n=395).

Subsequently, we decided to include documentary films, online videos, and other powerful data visualization resources (e.g., infographics, concept maps, timelines, before-and-after visualizations, etc.) as predominant pedagogical devices to introduce students to a collection of environmental problems and highlight how they impact everyday life. Inviting students to watch and reflect on documentaries such as *The True Cost* (2015) when discussing responsible consumption in the fashion industry, or reading up-to-date analytical visualization articles posted on *Earth.org* are two examples for how we attempted to create a course that will engage Gen Z students effectively.

In order to inspire students with diverse educational backgrounds, specializing in university degrees that are not necessarily connected to studying the environment or communication, to become the “critical agents of change” described in the UN’s 2030 Agenda for Sustainable Development as having a vital role in activating the social transformations needed for dealing with current environmental problems, our course aimed to equip them with the necessary green knowledge and communication skills. Our main aims were connected to: (1) empowering students to better understand environmental topics and become proactive in approaching them, while gaining a set of communication skills to help them in the process; (2) providing case studies that inspire and motivate students, as well as a best-practice guide including interviews with local representatives of environmental communication projects; (3) stimulating personal agency in dealing with environmental problems (i.e. approaching a solutions-oriented, instead of a problem-oriented perspective); (4) making sure students are equipped with the necessary skills for communicating effectively, persuasively and accurately on social media about environmental topics, while also being less vulnerable to disinformation, thus fostering digital media literacy skills.

To achieve these aims, the course included a consistently practical component, encouraging students to create relevant content on a collaborative Instagram account. For this purpose, students were offered creative freedom in order to adopt a specific green topic and a format for communicating it (ex: data- and image-driven presentations about saving water, tutorials on how to upcycle, how-to videos about recycling, audiovisual stories about local green initiatives, documenting personal explorations of how much plastic is included in “paper” cups, covering local events / initiatives etc.).

The skills targeted by the course included: (1) environmental literacy and awareness (understanding key environmental issues, like climate change, biodiversity loss, pollution, sustainability, etc.; being able to “translate” scientific and policy information for public audiences; identifying misinformation and ensuring accuracy in environmental messages on social media); (2) social media literacy and digital content creation (platform-specific communication strategies, visual storytelling through photography, videography and infographic design, the ability to write concise and engaging texts for social media, as well as use mobile-friendly design and video-editing tools, such as Canva and CapCut); (3) other transferable skills (critical thinking and ethical communication,

balancing advocacy with factual accuracy, facilitating digital dialogues and participatory communication, working in teams, and meeting deadlines).

In order to achieve our main aims and build the targeted skills, the course was divided into 5 modules, each blending communication science and environmental topics and being structured into 3 sections: “knowledge” (theoretical data), “inspiration” (case studies), and “action” (applied tasks). A summary of the main topics addressed, with each of the 5 modules connecting communication science and environmental topics, is shown in Figure 2.

Module number	Communication Science Topics	Environmental Topics
1.	Understanding creative and circular communication.	Soil biodiversity.
2.	Crafting an online green story: using public speaking and debate techniques to formulate arguments for environmental protection.	Zero-waste lifestyle, bioeconomy and circular economy.
3.	Digital video crafting techniques: the filming and editing process for a social media video.	Responsible consumption, collective social responsibility.
4.	Communicating persuasively and building the ethical arguments of a green story.	Sustainable living, greenwashing.
5.	Using art to communicate effectively on environmental topics.	Renewable energy, smart mobility.

Figure 2. A summarized description of the topics approached throughout the 5 modules of the course.

Throughout the semester, students were free to choose one or more environmental topics of interest, do additional research on them following a list of recommended sources, and consequently develop a social media content format (video, image gallery, infographic) using the communication techniques presented in class. The course was designed in a blended learning format, using Moodle, the university’s e-learning platform, to post all course materials, supplementary reading and references, as well as case studies and quizzes.

5.2. Implementation and outcome of the course

The course used student-centered teaching techniques to ensure the topics are well apprehended, including panel and step-by-step discussions, brainstorming sessions, the Frisco method, Socratic dialogues, and presenting case studies. The social media content created by students was analyzed in class as part of group discussions in which the student authors presented detailed descriptions of how they researched the topic and created the content. The process included both teacher evaluation and peer evaluation based on a set of marking points addressing topics discussed in class, i.e., integrating relevant and well-verified factual data based on provided sources / other relevant ones, formulating persuasive arguments and using effective storytelling techniques for social media, applying digital video filming and editing techniques, and building persuasive and

ethical arguments. The social media content created during the class was posted on a collaborative Instagram account entitled *@student.eco.in.timisoara*.

The teacher's classroom observations showed high levels of engagement and adaptability of students in response to the course's practical and interdisciplinary approach. When environmental topics were introduced through videos, infographics or collaborative tasks, learners actively participated, asked clarifying questions, or brought their own real-world experience into discussion. Their ability to understand and reflect on sustainability narratives revealed growing communicative competence and ecological awareness. Particularly during peer evaluations, a supportive learning climate was encouraged within the student group. Overall, students responded positively to the course's interactive, practically oriented format, showing curiosity, initiative, and a willingness to experiment with both the content and the form of green social media messages. Particular attention during class discussions was granted to exploring the opportunities and limits of using AI for digital content creation, highlighting how this practice, in some cases, can undermine students' ability to think critically and creatively. A tendency of some students to rely excessively on AI for media content creation was also noted during the teacher's classroom observation.

In the evaluation survey applied after the first year of implementation, the largest majority of the student group agreed or strongly agreed that the course was well organized and easy to follow (63% strongly agree), had an appropriate length and pace and generally met their expectations. Moreover, 46% of students strongly agreed that they feel confident coupling green topics with communication methods.

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
General questions					
3. Corresponded to the training philosophy of my University	60	34	6	0	0
4. Well-organized and easy to follow	63	37	0	0	0
5. Appropriate length (to content)	60	37	3	0	0
6. Appropriate pace	54	40	6	0	0
7. Met my expectations	46	46	8	0	0
Questions on learning experience					
9. Content was relevant to me.	49	40	11	0	0
10. Covered the topics effectively	63	37	0	0	0
11. Knowledge to Inspiration to Action was effective (learning style)	54	37	9	0	0
12. Tests, activities supplemented the training well	51	46	3	0	0
13. I retained the information	57	37	0	6	0
14. Offered opportunities for practice, collaboration, and application	51	40	9	0	0
15. Feel confident coupling green topics with communication methods	46	51	3	0	0
16. Trainer(s) succeeded to engage and facilitate	51	46	3	0	0
17. Clearly organised in Moodle platform	49	46	5	0	0
18. Moodle platform was attractive for the learner	43	49	8	0	0
19. No technical issues	46	46	6	0	2
20. "Action" clearly connected to the "Knowledge" and "Inspiration" parts	49	49	2	0	0
21. The time for self-study and activities was enough.	37	51	12	0	0
22. The GreenCool course is a much needed cross-curriculum course	50	47	3	0	0

Figure 3. Post-implementation survey gathering student feedback (numbers express percentages, n=35).

In addition to the quantitative questions listed in Figure 3, the survey included an open-ended question about what students liked or disliked about the course. Their responses provided positive feedback regarding (1) the creative freedom allowed with social media content creation, (2) the interactive methods of teaching and the flexibility offered by the blended learning format, (3) the fact that the course presented up-to-date

and relevant case studies, while the information was concise, and (4) theory and practice were well-balanced. However, some students also mentioned challenging aspects of the course, including (1) understanding a large amount of information and how it connects to everyday life, (2) using the university's Moodle platform, as well as graphic design and video editing apps, such as Canva and CapCut, and (3) producing creative green content for social media.

The course's outcome can be interpreted in close connection to the green citizenship framework outlined earlier in this study. Students' active in-class participation, collaborative peer evaluation, and production of engaged social media content suggest more than simple knowledge acquisition: they indicate the development of agency, critical reflection, and the capacity to translate environmental concerns into relevant content, which aligns with the literature describing green citizenship as both a practical and political mode of civic engagement (Stern, 2000; ENEC, 2018; Machin & Tan, 2024). The fact that learners connected sustainability narratives to their own experience also supports the idea that environmental education is most effective when it helps students move from abstract ecological issues toward everyday practices and real-world problem solving (Wood & Kallio, 2019; UNESCO, 2021). The implementation results also align with the literature on environmental communication and digital literacy. Students responded positively to the interdisciplinary and practice-oriented format, which is consistent with research arguing that environmental topics become more meaningful when taught through contemporary media tools, case studies, and competence-based learning (Lindenfeld et al., 2012; UNESCO, 2014; Portman et al., 2025). However, the difficulties reported by some students, especially in managing large quantities of information, technical aspects connected to the use of digital platforms, and AI-supported content creation, point to the limitations identified in earlier studies regarding the need for stronger critical media literacy in sustainability education (Goldman et al., 2020; Hudson, 2001; Auñón, 2024).

6. Limitations of the study and directions for future research

Several limitations should be taken into consideration when interpreting the findings of the current study. Firstly, our proposed transversal and interdisciplinary course integrating green citizenship into higher education curricula aligns with WUT's reflective-collaborative and student-centered teaching and learning model (Ilie et al., 2020), thus being situated within a specific institutional culture, which may limit the broader theoretical positioning of the study. The case study presented above prioritizes the in-depth description of the course over comparing or contrasting it with other established frameworks for curricular innovation in environmental education - one aspect which should be considered when interpreting the transferability of the findings. This limitation is partly mitigated by the inclusion of expert input from four countries during the curriculum design phase, which enhances its potential for transferability.

Secondly, a limitation of this study is the sample size of the focus group, which consisted of 8 students, resulting from a local selection process, and of the post-implementation cohort of respondents. We included here an evaluation of the course after its first year of implementation, consisting of a survey applied to the 35 students who enrolled and completed the course. An additional limitation could involve the timing of applying the evaluation survey - before the examination session -, potentially favoring positive answers. A future line of research could involve more frequent and extensive course evaluations, applied at different stages of its implementation.

Thirdly, this study has limitations related to the observation of students' reliance on AI tools during content creation. Because this issue emerged mainly through classroom observation, the study does not provide systematic data on the extent or frequency of AI use. Consequently, this aspect should be seen as a preliminary concern that highlights the need for further and more systematic research using targeted methods to examine how AI affects students' critical and creative engagement.

Finally, as we were involved in both the design and implementation of the course, we acknowledge the potential bias included in the current self-evaluation and recognize it as a potential limitation of the study. The post-implementation anonymous survey was intended to partially address this concern by capturing student feedback independently of the instructor's assessment. Independent evaluation could also be part of the course's future implementation.

7. Conclusions

This paper provided a detailed description of the curriculum design process, syllabus creation, implementation and outcome of a course integrating green citizenship into higher education curricula. Starting from the pressing need for universities worldwide to equip contemporary generations of students from a broad range of specializations to deal with current environmental challenges and the societal changes needed for facing them, the course we presented here proposed an effective model for obtaining tangible results in students' environmental knowledge and personal agency, as well as their media literacy skills and capacity to produce informed and persuasive digital content. While grounded in WUT's local pedagogical model, the course's content and design were developed to support broader applicability. In particular, the course integrates relevant knowledge and case studies offered by experts from the four Erasmus+ project countries that were part of the course's initial design, each bringing its own contextual specificity. This increases the course's transferability and helps it go beyond a single institutional perspective, making it potentially adaptable to other higher education contexts interested in green citizenship education.

Using a blended learning format, interdisciplinary learning modules, and social media tools, this course not only broadens the appeal of environmental communication to students from a wide range of faculties, but also transforms passive learners into proactive creators of environmental narratives disseminated across social media. The

survey applied to students who completed the course in its first year of implementation, together with the qualitative in-class observations, suggests positive student responses in several areas related to the course objectives. These include a self-reported improvement in awareness of everyday environmental topics, a stronger ability to identify misinformation and appreciate the importance of accuracy in presenting environmental data, and a perceived development of a sense of agency in adopting sustainable lifestyles and promoting them. However, while these findings are in line with the course's aim of fostering green citizenship, they should be interpreted as tentative and exploratory rather than as evidence of measured change over time.

Results from the first-year implementation of the course are in line with research showing the generally positive impact of teaching with technological tools and encouraging students to create their own narratives to communicate environmental topics (Viteri, 2021; Brereton, 2022; Cruger, 2017), and present improved digital literacy skills as a notable outcome (Talib, 2018; Portman et al., 2025). However, several challenges were also noted, including difficulties experienced by some students with filtering large amounts of data and connecting it with everyday life; problems with operating some of the technical tools needed for the course; and relying excessively on AI for producing media content. Recommendations for addressing these challenges in the following semesters might consist of including a basic data literacy section and using local and relatable data sets for documenting environmental topics, offering technical tutorials and encouraging peer support, as well as reframing AI as a brainstorming support, not a content generator, by requiring AI conversation logs and prompts used.

AI Use Statement

The final version of this paper was proofread using Grammarly to assist with suggestions regarding grammar and style. All final edits and content decisions were made exclusively by the authors.

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The Attractiveness of Curriculum-Embedded Mobility in Higher Education: Students' Perspective

Alexandru CARTIȘ*, Romiță IUCU**

Abstract

Curriculum-embedded mobility places an international learning experience within the formal structure of a study programme and may make participation compulsory for programme completion. This study examined students' perceptions of a model involving mandatory physical mobility, which could be short-term or extend to one or two semesters, with particular attention to perceived benefits, barriers, programme attractiveness, and institutional support. A convergent mixed-methods online survey was completed by 134 higher education students originating from 20 countries and studying in 17 countries. Most respondents were aged 18-28 (89.5%), 64.9% were women, 52.2% were bachelor's students, and 42.5% had previous physical mobility experience. Quantitative analyses combined descriptive statistics, non-parametric group comparisons, reliability and exploratory dimensionality checks, and Spearman correlations. Open-ended responses were analysed thematically and integrated with the quantitative results. Students with previous mobility experience reported strong academic, intercultural, linguistic, and transversal-skill benefits. Across the full sample, 92.5% indicated that embedded mobility would increase programme attractiveness, although responses also displayed limited variability and possible ceiling effects. Costs and living expenses were the most widely endorsed barrier, followed by complex procedures, curricular compatibility, and insufficient guidance. Students with and without previous mobility did not differ in their general attitudes towards embedded mobility, but previously mobile students perceived fewer barriers and expressed greater interest in a concrete master's programme requiring a semester abroad. Among mobile students, perceived institutional support, mobility valuation, perceived impact, and embedded-mobility attitudes were positively associated. Qualitative responses clarified that favourable evaluations were conditional on predictable recognition, adequate funding, curricular fit, and flexibility for students unable to travel. Embedded mobility therefore appears attractive to many students, but its legitimacy as a curricular requirement depends on whether institutions make participation academically coherent, financially feasible, and administratively dependable.

Keywords: curriculum-embedded mobility; higher education internationalisation; student perceptions; academic recognition; equity; European Higher Education Area.

* Assistant Professor PhD, Faculty of Psychology and Educational Sciences, University of Bucharest, CIVIS, Europe's Civic University Alliance, alexandru-mihai.cartis@unibuc.ro, ORCID: 0000-0003-2331-2755.

** Professor PhD, Faculty of Psychology and Educational Sciences, University of Bucharest, the Romanian Academy, CIVIS, Europe's Civic University Alliance, romita.iucu@unibuc.ro; ORCID: 0000-0002-7714-1069.



1. Introduction

Internationalisation has become an integral dimension of higher education, extending beyond voluntary exchanges towards the systematic inclusion of international and intercultural learning in curricula. Within the European Higher Education Area (EHEA), mobility windows, joint programmes, blended mobility, and European University Alliances have contributed to a gradual shift from mobility as an additional opportunity towards mobility as a planned component of educational provision (EHEA, 2009, 2012; European Commission et al., 2025; Ferencz et al., 2013). This shift is visible in programmes in which an international learning period is credit-bearing, aligned with programme learning outcomes, and required for successful completion.

In this article, *curriculum-embedded mobility* refers to physical international mobility formally integrated into a study programme or other educational activities. As presented to survey respondents, it could be short-term or extend to one or two semesters, and all students enrolled in the relevant programme would be expected to participate. This definition is narrower than broader forms of internationalisation at home or virtual exchange and more specific than optional mobility undertaken alongside a programme, placing particular responsibility on the programme consortium and participating institutions because students cannot be expected to absorb avoidable academic, administrative, or financial risks created by a curricular requirement.

The potential educational value of mobility is well established, as international experience may support intercultural learning, transversal skills, language development, academic engagement, and professional orientation (European Commission et al., 2014; Krzaklewska, 2008; Lesjak et al., 2015). Yet participation remains socially uneven since financial constraints, family and employment responsibilities, recognition uncertainty, curricular incompatibility, and administrative burden continue to restrict access (Brooks et al., 2024; Hovdhaugen & Wiers-Jenssen, 2021; Muja et al., 2024). Embedding mobility in a curriculum may reduce some of these uncertainties through prior planning and automatic recognition, but compulsion can also intensify them when funding, flexibility, and alternatives are inadequate.

Students' acceptance is therefore not a secondary implementation issue. A programme that formally guarantees international exposure may be attractive because it signals coherent academic design, predictable recognition, and equal access to an experience otherwise dependent on individual initiative. The same programme may be unattractive when the required mobility is unaffordable, poorly aligned with students' academic interests, or incompatible with health, work, disability, or caring responsibilities. This balance makes embedded mobility a useful test of how internationalisation distributes responsibility between students and institutions.

The present study examines how students evaluate a hypothetical programme model containing mandatory curriculum-embedded physical mobility, distinguishing between previous mobility experience, general attitudes towards embedded mobility, the perceived effect of mobility on programme attractiveness, and interest in a concrete

master's-programme scenario. This distinction is important because the study does not compare observed outcomes from equivalent optional and compulsory programmes. Instead, it combines respondents' reports of previous physical mobility with their evaluations of explicitly described embedded-mobility scenarios.

2. Literature review and conceptual framing

2.1. *Embedded mobility as curricular design*

The concept of *embedded mobility* is closely connected to the mobility window: a period reserved within a curriculum for study abroad and supported by prior curricular planning and recognition arrangements (Ferencz et al., 2013). The defining feature is not that mobility receives credit, but that it is anticipated in programme sequencing and connected to learning outcomes, assessment, and progression. Embedded mobility can therefore range from short, course-based mobility to a semester or year located within a joint or networked curriculum.

Internationalisation of the Curriculum provides a relevant pedagogical frame because it treats international and intercultural learning as part of curriculum design rather than an extracurricular addition (Beelen & Jones, 2015; Leask, 2015). From this perspective, mobility has educational legitimacy when its learning outcomes, teaching arrangements, assessment, and recognition are constructively aligned. *Transformative Learning theory* provides a complementary account of how encounters with unfamiliar cultural and academic contexts may prompt reflection and perspective change (Mezirow, 2000). Neither perspective, however, removes the practical question of whether students can participate on equitable terms.

European policy has increasingly promoted diversified and more integrated mobility formats. The Bologna mobility objective, Erasmus+, joint programmes, blended intensive programmes, and European University Alliances all seek to widen access while improving recognition and curricular coherence (EACEA, 2020; EHEA, 2012; European Commission, 2025; European Commission et al., 2025). Nevertheless, institutional implementation remains constrained by incompatible calendars, recognition practices, administrative workload, and uneven legal or quality-assurance arrangements (Colucci et al., 2012; Crăciun et al., 2023; López-Duarte et al., 2021). Embedded mobility is consequently better understood as an institutional design commitment than as a self-executing policy instrument.

2.2. *Student value, participation, and equity*

Students commonly associate international mobility with academic development, career prospects, personal growth, cultural exploration, and language acquisition (Bryntesson et al., 2018; Krzaklewska, 2008; Lesjak et al., 2015). Large-scale evaluations similarly report perceived gains in transversal skills and employability-related competences (European Commission et al., 2014). These benefits are not uniform, however, and retrospective evaluations may reflect self-selection: students who participate are often

already motivated, mobile, and comparatively well positioned to manage the costs and uncertainty involved.

Financial resources remain the most persistent participation barrier across European systems. Students may also be constrained by family responsibilities, paid work, disability or health needs, language, visa requirements, curricular incompatibility, and uncertainty regarding credit transfer (Hovdhaugen & Wiers-Jenssen, 2021; Muja et al., 2024). Such constraints are not just individual preferences, but they are shaped by programme rules, funding schedules, information quality, staff capacity, and institutional coordination. When mobility becomes compulsory, unresolved barriers may become progression barriers.

From an equity perspective, curricular integration has two opposing possibilities. On one side, it may widen participation by normalising mobility, planning it in advance, and guaranteeing recognition. On the other, it may also reproduce inequality if all students are subject to the same requirement but do not receive the resources or alternatives needed to fulfil it. The relevant question is therefore not whether compulsory mobility is inherently inclusive, but under what conditions it becomes feasible for students with different material circumstances and responsibilities (Brooks et al., 2024).

2.3. Institutional support and conditional attractiveness

Recognition and support are repeatedly identified as central to students' mobility decisions. Clear information, realistic funding, accessible guidance, and predictable credit transfer reduce perceived academic and administrative risk (De Moor & Henderikx, 2013; López-Duarte et al., 2021). Support must also cover the full mobility lifecycle: preparation, participation, academic problem-solving, return, reintegration, and recognition. Fragilities and shortcomings at any stage may reduce the value of otherwise positive learning experiences.

This suggests that the attractiveness of embedded mobility is likely to be conditional. Students may value international learning while remaining reluctant to enrol in a programme that imposes uncertain costs or limits their agency. Conversely, a compulsory mobility period may become attractive when it is presented transparently at admission, aligned with disciplinary interests, funded adequately, and supported by credible recognition procedures. Student attitudes can therefore illuminate the relationship between curriculum design and institutional responsibility.

2.4. Research gaps and contribution

Three gaps guide the study. First, much of the literature concerns self-selected participants in optional mobility and therefore provides limited evidence about how students evaluate mobility when it is presented as a programme requirement. Second, studies of mobility barriers often examine participation in general rather than the implications of converting mobility into a curricular expectation. Third, institutional support is widely recognised as important, but there is limited student-centred evidence

connecting experiences of support during previous mobility with attitudes towards future embedded-mobility provision.

The study addresses these gaps without assuming that hypothetical programme evaluations are equivalent to behaviour in an actual compulsory programme. Its contribution lies in examining the conditional attractiveness of an explicitly described embedded-mobility model, combining quantitative patterns with students' own explanations, and distinguishing general attitudes from interest in a concrete programme scenario.

2.5. Aim and research questions

The study aimed to examine students' perceptions of curriculum-embedded mobility and the academic, institutional, and equity-related conditions associated with its attractiveness. Four research questions were addressed:

RQ1. What academic, personal, intercultural, linguistic, and professional outcomes do students with previous physical mobility experience report, and how satisfied are they with institutional and host support?

RQ2. Which financial, administrative, academic, and personal barriers do students associate with participation in curriculum-embedded mobility?

RQ3. How attractive do students perceive programmes containing mandatory curriculum-embedded mobility to be, and are these perceptions related to previous mobility experience?

RQ4. Among students with previous physical mobility experience, how are perceived institutional support, mobility valuation, perceived impact, and attitudes towards curriculum-embedded mobility associated?

3. Methods

3.1. Research design

A convergent mixed-methods survey design was used (Creswell & Plano Clark, 2018; Greene et al., 1989). Quantitative and qualitative data were collected in the same online questionnaire between August and November 2024. The strands were analysed separately and integrated through research-question-based interpretation and a joint display. Quantitative data described mobility experiences, barriers, programme attractiveness, group differences, and associations among focal constructs. Open-ended responses provided contextual evidence concerning recognition, financial feasibility, curricular fit, institutional support, agency, and perceived added value.

Table 1 maps each research question to the evidence used in the analysis.

Table 1. Research questions and data strands

Research question	Quantitative evidence	Qualitative evidence
RQ1	Six mobility-valuation items; seven impact items; eight support / satisfaction items; respondents with previous mobility only ($n = 57$)	Elaborations on how previous mobility was, or was not, integrated into the curriculum ($n = 40$ substantive responses)
RQ2	Thirteen perceived-barrier items; barrier-index comparison by previous mobility	Comments concerning costs, recognition, support, work / caring constraints, and alternatives
RQ3	Ten-item embedded-mobility attitude scale; single programme-attractiveness item; interest in Programme B; comparisons by previous mobility	Comparison of embedded and traditional mobility ($n = 65$ substantive responses); explanations of programme appeal ($n = 60$); perceived added value of Programme B ($n = 61$)
RQ4	Spearman correlations among support, valuation, impact, and embedded-mobility attitudes in the mobile subsample	Explanations concerning predictability, recognition, administrative support, and programme credibility

3.2. Participants and sampling

The survey link was accessed by 302 individuals. Responses were excluded when the questionnaire was incomplete or the respondent did not meet the target-population criterion of being a current higher education student. The final analytic sample comprised 134 complete and eligible responses. Convenience and snowball sampling were used through academic networks, institutional mailing lists, student groups, and social-media channels. The sample should therefore not be interpreted as representative of European higher education students.

Participants originated from 20 countries and were studying in 17 countries. Romania accounted for 62.7% of countries of origin and 64.2% of countries of study. Other recurrent countries of origin included Cyprus (6.0%), France (4.5%), Greece (4.5%), Germany (3.0%), Iran (3.0%), and Türkiye (3.0%). Countries of study after Romania included Cyprus (6.0%), France (4.5%), Greece (3.7%), Belgium (3.0%), and Türkiye (3.0%). The sample was therefore internationally distributed but strongly concentrated in Romania and Eastern Europe.

Most respondents were aged 18-28 (89.5%), 64.9% were women, and 52.2% were bachelor's students. Previous physical academic mobility was reported by 57 students (42.5%); 77 (57.5%) had not participated. Among mobile respondents, 57.9% reported semester-long mobility, 35.1% short-term mobility, and 7.0% year-long mobility. Table 2 summarises the principal characteristics. Field of study and institution name were not collected, preventing disciplinary or institution-level description and comparison.

Table 2. Participant characteristics (n = 134)

Variable	Category	N	%
Age	18-22	70	52.2
	23-28	50	37.3
	29-45	11	8.2
	46 or older	3	2.2
Gender	Female	87	64.9
	Male	43	32.1
	Other / prefer not to answer	4	2.9
Current study level	Bachelor's	70	52.2
	Master's	49	36.6
	Doctoral / postdoctoral	14	10.5
	Other postgraduate	1	0.7
Previous physical mobility	Yes	57	42.5
	No	77	57.5
Type of mobility (n = 57)	Semester	33	57.9
	Short-term	20	35.1
	Academic year	4	7.0
Programme financing	Tuition-free / scholarship	108	80.6
	Fee-paying	26	19.4
Paid work during studies	Yes	55	41.0
	No	79	59.0
Children	At least one child	9	6.7
	No children / prefer not to answer	125	93.3
Plans after graduation	Further study	45	33.6
	Employment	65	48.5
	Undecided	24	17.9

3.3. Questionnaire and measures

The questionnaire was developed specifically for this study. It was informed by literature on student mobility motivations, perceived outcomes, barriers, recognition, and curricular integration, but it was not a direct adaptation of a previously validated inventory. Items concerning previous mobility drew on established themes in international-mobility research, while the embedded-mobility section was constructed around a programme scenario developed for the study. The complete questionnaire is provided in the supplementary material.

Before answering the embedded-mobility items, participants were given a definition and example. Embedded mobility was described as physical mobility integrated into the curriculum, required for all students, potentially lasting from one week to two semesters, and supported administratively and academically. A master's-programme illustration required every student to spend at least one semester at a partner university. The attitudinal findings therefore concern this explicitly mandatory and curriculum-integrated model rather than virtual mobility or optional exchange in general.

Seven composite measures were calculated as item means, with higher scores indicating more of the focal construct. Programme-competence fit comprised three items ($\alpha = .76$). For respondents with previous mobility, mobility valuation comprised six items concerning outcomes and intention to participate again ($\alpha = .77$); institutional-support satisfaction comprised overall satisfaction and seven lifecycle or host-support items ($\alpha = .83$); and personal-professional impact comprised seven items ($\alpha = .86$). Embedded-mobility attitudes comprised ten positively worded items ($\alpha = .81$). The importance of programme-choice factors comprised 12 items ($\alpha = .82$). The broad barrier index comprised 13 items ($\alpha = .71$). McDonald's omega values closely resembled alpha values and are reported in the supplementary material.

Two single items were analysed separately. Programme-attractiveness effect asked whether embedded mobility would significantly increase, somewhat increase, have no effect on, somewhat decrease, or significantly decrease the attractiveness of a study programme. Programme B interest followed a vignette comparing an optional-mobility master's programme with a programme requiring one semester abroad and asked respondents to rate their interest in Programme B from 1 (*not interested at all*) to 5 (*extremely interested*).

Because the embedded-mobility items were newly constructed, exploratory checks were performed using principal-axis factoring, factorability statistics, and parallel analysis. For the ten-item embedded-mobility attitude scale, the Kaiser-Meyer-Olkin value was .81 and Bartlett's test was significant, $\chi^2(45) = 369.45$, $p < .001$. Parallel analysis retained one factor. Loadings ranged from .39 to .69, supporting use of an overall attitude score while indicating that perceived ease of curricular integration was the weakest item.

For the 13 barrier items, the Kaiser-Meyer-Olkin value was .65 and Bartlett's test was significant, $\chi^2(78) = 275.35$, $p < .001$. Parallel analysis suggested two factors. However, the two-factor oblique solution did not produce a sufficiently stable or conceptually balanced structure: one factor was dominated by adaptation to a new cultural environment, several items cross-loaded, and programme costs had low communality. The broad barrier index was retained for descriptive and exploratory group-comparison purposes rather than treated as a validated unidimensional scale. Item-level results remain primary in the interpretation of barriers. Full loadings, communalities, and retention information are included in the supplementary material. A confirmatory factor analysis was not undertaken because the sample was inadequate for a stable item-level multi-construct model.

3.4. Procedure and research ethics

The questionnaire was administered through QuestionPro and required approximately 30 minutes. Participants received information about the study purpose, voluntary participation, their right to omit questions or withdraw, confidentiality, future scholarly dissemination, and data processing under the General Data Protection Regulation.

Electronic informed consent and confirmation of being at least 18 years old were required before the survey opened. Responses were analysed in aggregate, and no direct personal identifiers were included in the analytic dataset.

Under the institutional procedures applicable at the authors' institution, formal ethics approval was not required for this type of anonymous, minimal-risk, non-interventional educational survey. The study nevertheless followed the institution's applicable research-integrity and data-protection requirements.

3.5. Data analysis

Quantitative analyses were conducted in jamovi 2.6 and independently checked from the archived dataset. Frequencies, percentages, means, standard deviations, medians, interquartile ranges, skewness, and item distributions were examined. Many ordinal items were strongly skewed towards favourable responses. Group comparisons by previous mobility therefore used Mann-Whitney U tests consistently, with rank-biserial correlations as effect sizes. Spearman correlations were used in the mobile subsample to examine associations among institutional support, mobility valuation, perceived impact, and attitudes towards embedded mobility.

The originally explored serial mediation specification was not retained in the revised analysis. The cross-sectional design does not establish temporal ordering, and estimating multiple support-item contrasts and mediating paths with only 57 mobile respondents would be statistically fragile. RQ4 was therefore addressed through transparent bivariate associations. This choice also reduces the risk that conceptual overlap among favourable-evaluation constructs is interpreted as a causal mechanism.

Qualitative analysis followed the six phases of thematic analysis: familiarisation, initial coding, candidate-theme development, theme review, definition and naming, and reporting (Braun & Clarke, 2006). Coding was undertaken by one author and was inductive: codes, themes, and relevant cases were generated from the collected responses rather than imposed through a predetermined coding framework. The analysis remained oriented towards the research questions and retained responses that challenged the dominant positive pattern as divergent cases. It focused principally on three embedded-mobility prompts concerning differences from traditional mobility, the effect on programme appeal, and the added value of Programme B. Short non-substantive responses were excluded from thematic interpretation. Quantitative and qualitative findings were integrated through a joint display. Because coding was conducted by a single author, no intercoder-agreement statistic was calculated.

4. Results

4.1. RQ1: Previous mobility experiences, outcomes, and support

Among the 57 students with previous physical mobility experience, evaluations were strongly favourable. Agreement that mobility contributed to transversal skills reached 94.8%; 93.0% reported a positive academic-pathway impact; 91.3% reported rich

intercultural exposure; and 84.2% reported improved foreign-language skills. Professional-pathway impact was more differentiated, although 68.4% still agreed or strongly agreed. A further 78.9% indicated that they would undertake another mobility if given the opportunity (Figure 1).

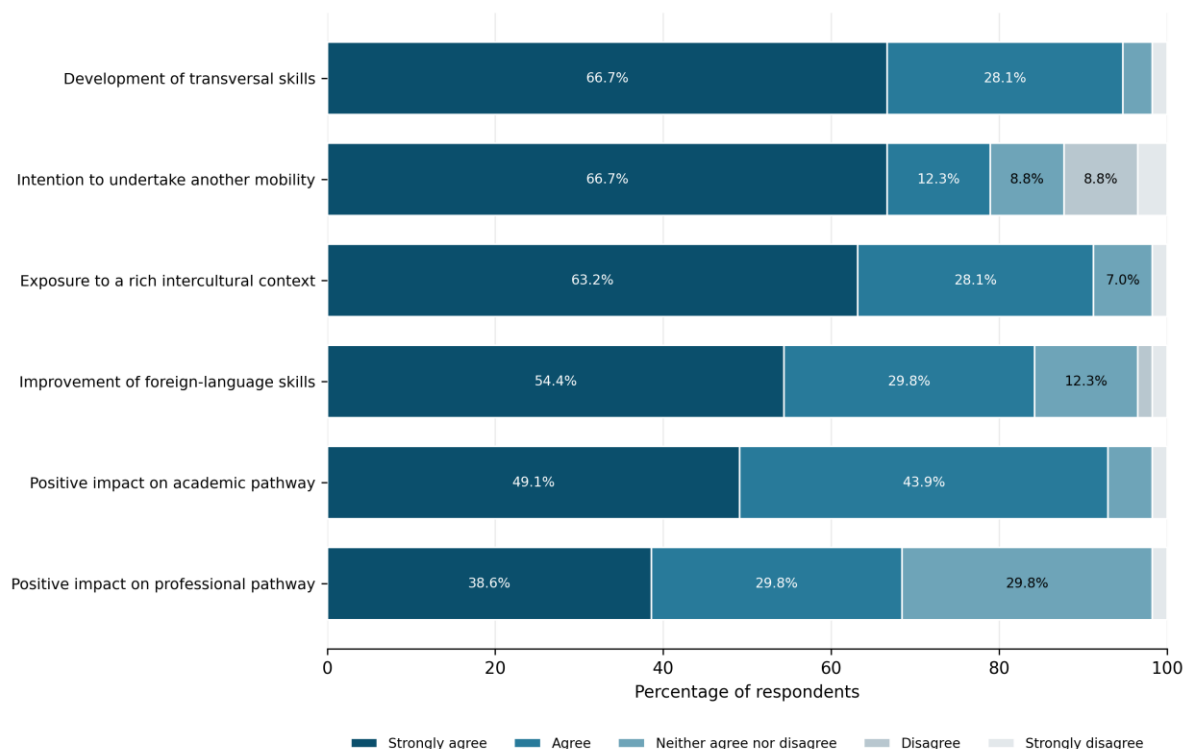


Figure 1. Students' perceptions of academic mobility impact (n = 57)

The concentration of responses in the two favourable categories indicates both strong perceived value and restricted variance. For example, two-thirds strongly agreed that mobility developed transversal skills and that they would undertake mobility again. These distributions should therefore be interpreted as retrospective evaluations by a self-selected mobile group rather than estimates of effects caused by mobility.

Satisfaction varied across the mobility lifecycle (Figure 2). Host-institution courses and programmes were rated satisfied or very satisfied by 84.2%, support and counselling by 84.2%, and social and cultural activities by 82.5%. Satisfaction was lower for support during mobility (73.7%), credit recognition and reintegration (68.4%), overall lifecycle support (68.4%), and pre-departure guidance (66.7%).

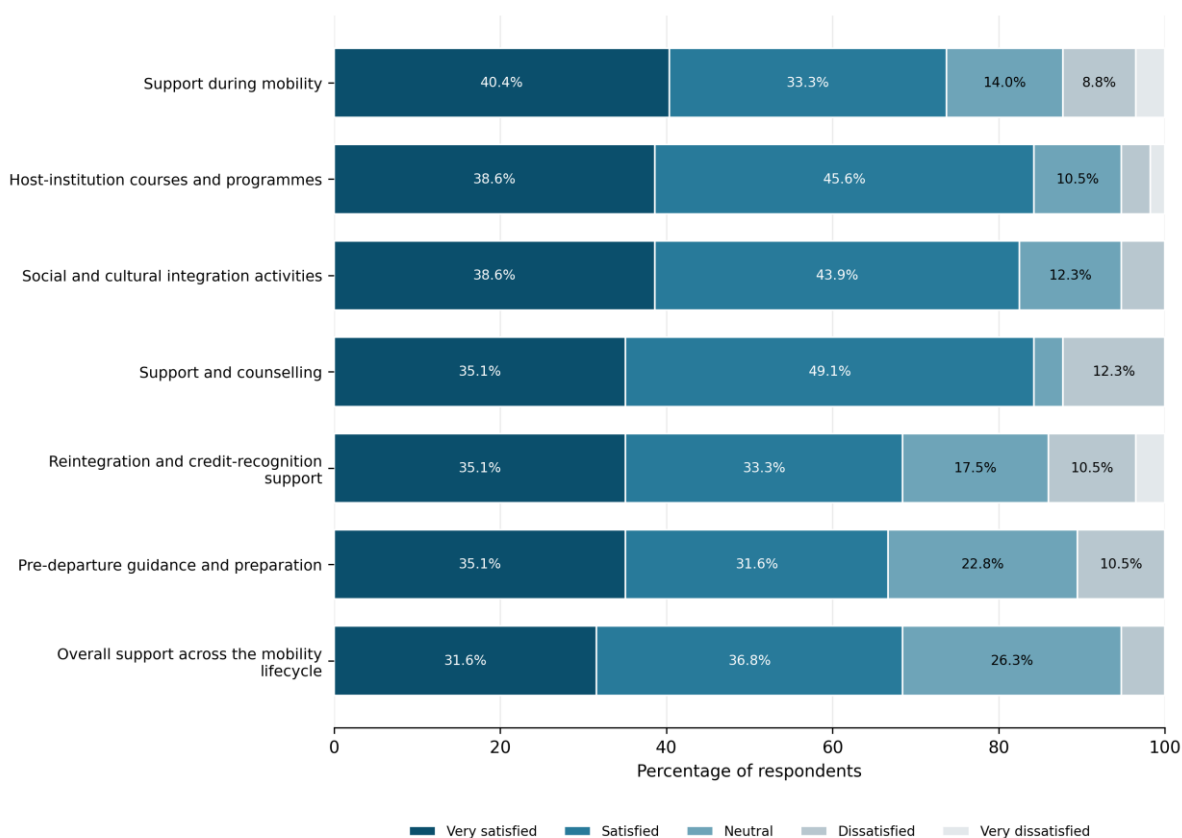


Figure 2. Ratings of student satisfaction with mobility support and host offer (n = 57)

Open-ended accounts of curricular integration were uneven. Some students reported full recognition or that mobility courses replaced home-programme requirements. Others described partial recognition, weak correspondence between courses, or complete non-recognition. One doctoral respondent stated that a blended intensive programme closely related to the doctoral topic had not been recognised as an academic course (P56). These responses clarify why generally positive experiential evaluations coexisted with weaker ratings of post-mobility recognition.

4.2. RQ2: Perceived barriers and equity considerations

Costs and living expenses were the most widely endorsed barrier: 90.3% agreed or strongly agreed that they represented a challenge (Figure 3). Complex application procedures and limited information were endorsed by 77.6%, programme compatibility by 76.9%, language barriers by 68.7%, and limited support and guidance by 68.6%. Safety and health concerns were endorsed by 63.4%, calendar differences by 58.9%, and high academic demands by 55.9%. Cultural adaptation, cultural misunderstanding, homesickness, and combining study with travel were less uniformly endorsed, although each remained relevant to a substantial minority.

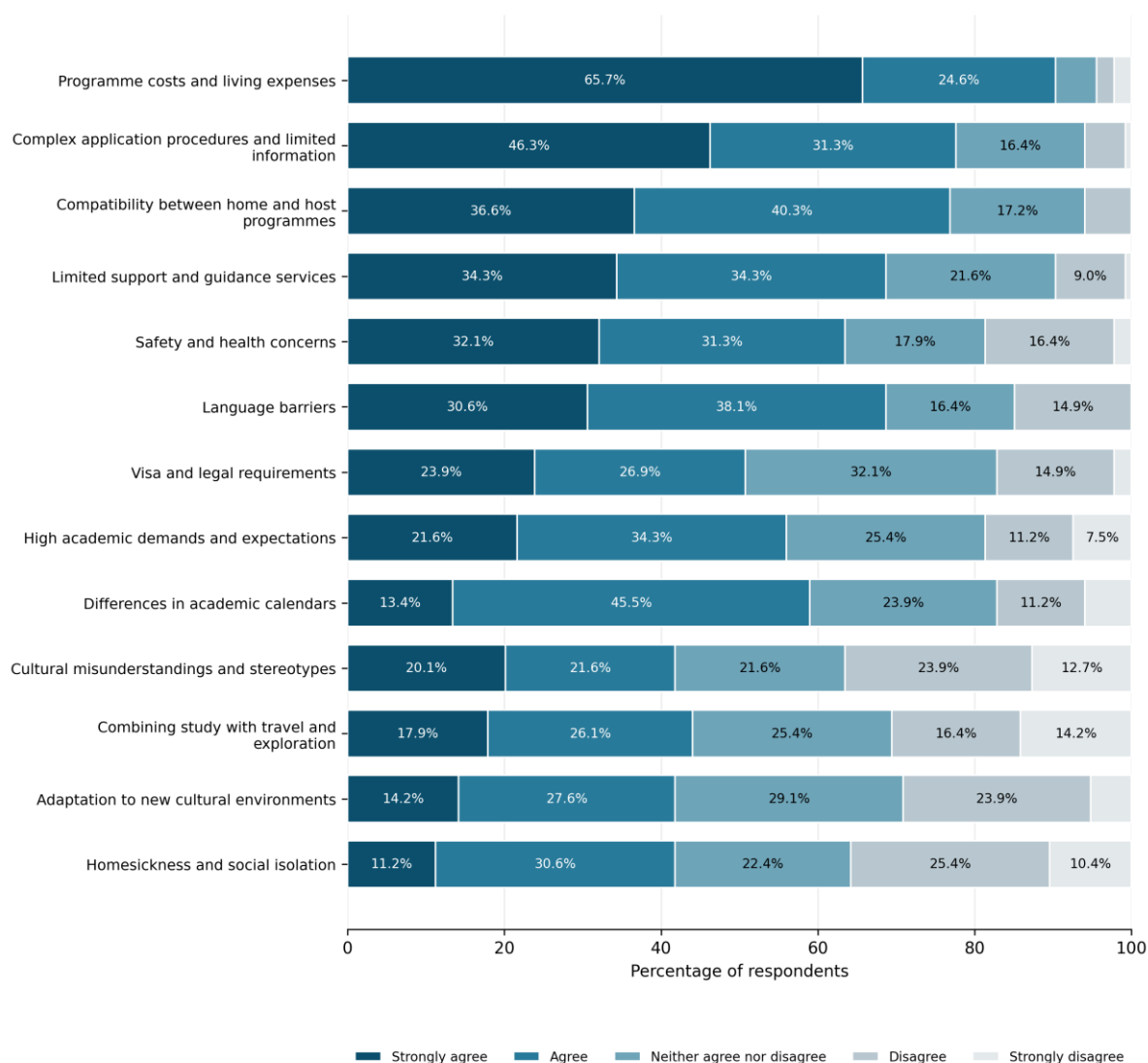


Figure 3. Student perceptions of factors represent barriers / challenges to participating in programmes with curriculum-embedded mobility (n = 134)

Students with previous mobility experience reported a lower broad barrier score (Mdn = 3.54) than students without previous mobility (Mdn = 3.77), $U = 1,701.5$, $p = .026$, $r_{rb} = -.225$. This small effect may reflect greater familiarity and mobility capital among participants, but the cross-sectional design cannot determine whether mobility reduced perceived barriers or students who perceived fewer barriers were more likely to participate.

Qualitative responses reinforced the structural character of the most salient barriers. A respondent who otherwise viewed embedded mobility positively warned that an unfunded requirement could create severe financial constraints and argued that “equity of access ... should be ensured through some form of financial support” (P16). Another respondent described mandatory mobility as potentially burdensome without assurance of financial independence and called for scholarships to make participation fair (P34). Participants also emphasised that affordability alone was insufficient: academic fit,

recognition, clear information, and alternatives for students with justified constraints were repeatedly mentioned.

4.3. RQ3: Attitudes, programme attractiveness, and previous mobility

The ten embedded-mobility attitude items were generally favourable (Figure 4). The highest combined agreement concerned expansion of academic or professional networks (90.3%), in-depth cultural experience (80.6%), programme appeal (80.6%), global belonging (80.6%), labour-market opportunities (78.4%), and coherent or innovative learning (77.6%). Perceived ease of integration into the programme structure was notably less positive: 47.7% agreed, 29.1% were neutral, and 23.1% disagreed. Students therefore distinguished the potential value of embedded mobility from the practical ease of implementing it.

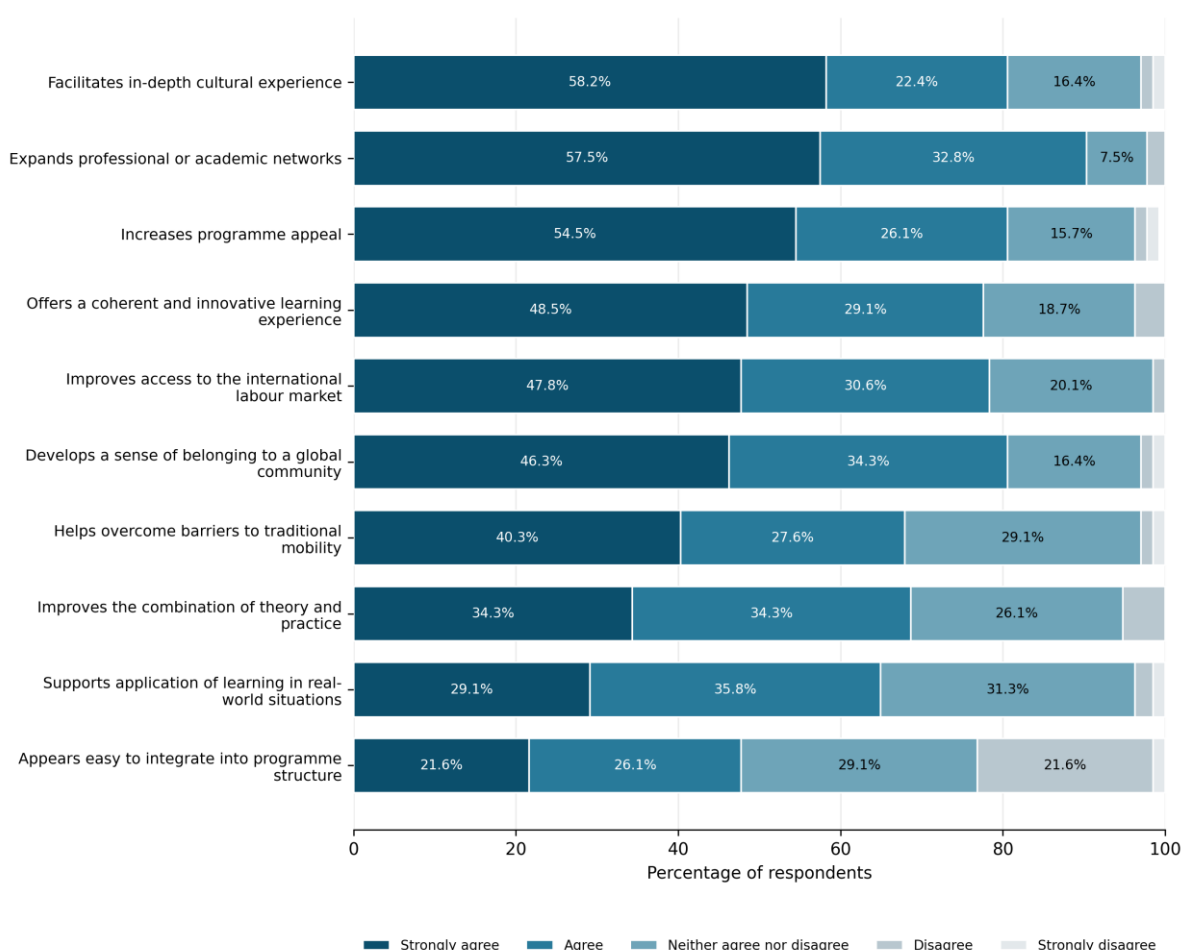


Figure 4. Student perceptions of curriculum-embedded mobility benefits (n = 134)

When asked directly how embedded mobility would affect programme attractiveness, 52.2% selected *significantly increase* and 40.3% selected *somewhat increase*. Only 4.5% selected *no impact*, and 3.0% selected either decrease category. In the Programme B vignette, 67.9% were very or extremely interested, 19.4% were moderately interested, and 12.7% were slightly or not at all interested.

General embedded-mobility attitudes did not differ between previously mobile and non-mobile students, nor did the single programme-attractiveness item. However, previously mobile students expressed greater interest in the concrete Programme B scenario, $U = 2,731.5$, $p = .011$, $rrb = .245$. They also rated their current programmes as a somewhat better fit with desired competences. Table 3 presents the full set of planned comparisons.

Table 3. Comparisons by previous physical mobility experience

Outcome	Previous mobility, M (SD); Mdn (IQR)	No previous mobility, M (SD); Mdn (IQR)	U	p	rrb
Programme-competence fit	3.98 (0.88); 4.00 (1.33)	3.71 (0.73); 4.00 (0.67)	2,724.5	.016	.242
Embedded-mobility attitude	4.15 (0.55); 4.20 (0.70)	4.09 (0.56); 4.10 (0.80)	2,251.0	.801	.026
Importance of enrolment factors	4.20 (0.51); 4.17 (0.75)	4.08 (0.56); 4.17 (0.75)	2,409.5	.334	.098
Perceived barriers	3.56 (0.48); 3.54 (0.54)	3.71 (0.54); 3.77 (0.62)	1,701.5	.026	-.225
Programme-attractiveness effects	1.54 (0.80); 1.00 (1.00)	1.64 (0.76); 2.00 (1.00)	1,988.5	.299	-.094
Interest in Programme B	4.12 (0.89); 4.00 (1.00)	3.64 (1.12); 4.00 (2.00)	2,731.5	.011	.245

**a Lower values indicate a stronger increase in programme attractiveness. Positive rank-biserial correlations indicate higher values among previously mobile students.*

Qualitative responses explained both the appeal and its conditionality. Participants associated embedded mobility with predictable recognition, reduced bureaucracy, coherent learning outcomes, equal international exposure, networking, and personal development. One respondent argued that embedded mobility could offer “streamlined procedures, seamless credit transfer and increased administrative support” (P16). Another emphasised that the decision would be visible from the beginning of the programme and would therefore provide “a sense of recognition” (P2).

At the same time, mandatory participation was not universally considered an advantage. One participant wrote that easier access would be welcome, but “if it’s not something I want then being forced to do it might lead to repulsion” (P25). A divergent response stated that mobility was not a deciding factor as long as both programmes offered some form of international opportunity (P73). The qualitative evidence therefore supports conditional rather than unconditional attractiveness.

4.4. RQ4: Institutional support, mobility valuation, and attitudes

Among previously mobile students, all four focal constructs were positively associated (Table 4). Institutional-support satisfaction correlated with mobility valuation ($\rho = .414$), perceived personal-professional impact ($\rho = .495$), and attitudes towards embedded mobility ($\rho = .385$). Mobility valuation and perceived impact were strongly related ($\rho = .717$), suggesting substantial conceptual and experiential overlap. Both were moderately associated with embedded-mobility attitudes.

Table 4. Spearman correlations among focal constructs in the previously mobile subsample (n = 57)

Construct	1	2	3	4
1. Institutional-support satisfaction	—			
2. Mobility valuation	.414**	—		
3. Personal-professional impact	.495***	.717***	—	
4. Embedded-mobility attitude	.385**	.407**	.416**	—

These associations do not establish that support causes favourable attitudes or that one construct mediates another. They nevertheless show that students who evaluated their previous support more positively also tended to value mobility more strongly, report greater impact, and hold more favourable attitudes towards an embedded model. The qualitative accounts indicate why recognition may be particularly consequential: predictable credit transfer was described not simply as an administrative convenience, but as evidence that the institution had designed the mobility period as a credible part of the programme.

4.5. Integration of quantitative and qualitative findings

Table 5 summarises the principal points of convergence and qualification across the two data strands.

Table 5. Mixed-methods joint display

Quantitative pattern	Qualitative explanation or qualification	Integrated interpretation
Previous mobility was evaluated positively across most outcomes.	Students described academic, cultural, linguistic, and networking gains, but some reported partial or absent recognition.	Experiential value can coexist with institutional friction.
Costs were the strongest barrier; procedures, compatibility, and guidance also ranked highly.	Respondents linked compulsory mobility to funding guarantees, recognition, clear information, and alternatives for constrained students.	Equity depends on structural feasibility, not curricular inclusion alone.
Embedded mobility increased programme attractiveness for most respondents.	Respondents valued predictability and integrated design, but some resisted compulsion or prioritised academic fit over mobility.	Attractiveness is high but conditional on agency and implementation quality.
Support, valuation, impact, and attitudes were positively associated.	Recognition and lifecycle support were treated as signals of programme credibility.	Institutional dependability is one component of favourable evaluation, alongside perceived educational value.

5. Discussion

5.1. RQ1: Mobility is highly valued, but retrospective evaluations are selective

Students with previous mobility experience reported substantial academic, intercultural, linguistic, and transversal-skill value. These findings align with research describing mobility as both instrumental and developmental (European Commission et al., 2014;

Krzaklewska, 2008; Lesjak et al., 2015). The particularly strong ratings for transversal and intercultural outcomes support the educational rationale for integrating international experience into curricula.

The results should not, however, be read as estimates of causal impact. The mobile subsample was self-selected, and the distributions were strongly concentrated at the favourable end of the response scale. Students who complete mobility may be especially motivated to interpret it positively, and the use of predominantly affirmative item wording may have encouraged acquiescent responses. Professional-pathway benefits were less uniformly endorsed than academic or personal benefits, providing some evidence that respondents did not evaluate every domain identically.

Satisfaction results also show that mobility is not a single experience. Host teaching and socio-cultural provision were evaluated more positively than preparation, lifecycle support, and recognition. This distinction supports a process-oriented view in which educational outcomes and institutional arrangements should be assessed separately. Positive learning does not cancel administrative weakness.

5.2. RQ2: The principal barriers are structural

Costs, application complexity, programme compatibility, and limited guidance were more salient than homesickness or cultural adaptation. This pattern is consistent with European evidence that financial and institutional conditions remain central to participation (Hovdhaugen & Wiers-Jenssen, 2021; Muja et al., 2024). The lower barrier score among previously mobile students may reflect familiarity, successful navigation, or pre-existing mobility capital. It should not be interpreted as evidence that mobility itself removes barriers.

For embedded mobility, structural barriers acquire additional importance because participation is tied to progression. A requirement that is academically coherent but financially inaccessible is not equitable. Similarly, formal recognition rules have limited value if students still face uncertainty, delays, or discretionary decisions after returning. The qualitative findings reinforce the need to treat affordability and recognition as design conditions established before enrolment and departure.

5.3. RQ3: Programme attractiveness is substantial but conditional

Most respondents indicated that embedded mobility would increase programme attractiveness, and more than two-thirds were very or extremely interested in the concrete Programme B scenario. At the same time, general attitudes did not differ by previous mobility experience. This suggests that the broad idea of embedded mobility appeals to both mobile and non-mobile students, whereas previous experience may be more relevant when respondents imagine committing to a specific semester-abroad requirement.

The study does not establish that students evaluate embedded mobility more favourably than an otherwise equivalent optional programme. Programme A was not rated separately, and the survey did not randomly assign alternative programme

descriptions. The findings instead show that respondents could articulate perceived added value when asked to compare the formats and that many expressed interest in Programme B. Claims of superiority over optional mobility would require an experimental vignette design, matched programmes, or observed enrolment decisions.

The qualitative material highlights an important pressure between structure and agency. Advance knowledge of the mobility requirement can improve predictability, but compulsion may discourage students who cannot travel or who prefer other forms of international learning. Embedded mobility is therefore most credible when programmes preserve meaningful choice concerning destination, timing, format, or justified alternatives while maintaining common learning outcomes.

5.4. RQ4: Support is associated with favourable evaluation, not demonstrated as a causal mechanism

Institutional support, mobility valuation, perceived impact, and attitudes towards embedded mobility were moderately associated. The strong relationship between valuation and impact indicates that students' judgements of benefit are not sharply separable. This overlap, together with the small mobile subsample and cross-sectional design, made a complex serial mediation interpretation inappropriate.

The revised findings support a narrower conclusion: students who were more satisfied with support also tended to evaluate mobility and embedded-mobility provision more favourably. Recognition emerged qualitatively as a visible test of whether the programme could fulfil its commitments. It is therefore reasonable to interpret institutional dependability as one condition of attractiveness, but not as a variable shown to outweigh learning gains or causally produce acceptance.

The idea of embedded mobility as a *programme-level commitment* can be retained as a provisional theoretical interpretation. When mobility is compulsory, students evaluate not only the anticipated international experience but also the programme's ability to make that experience feasible and academically safe. The present study did not directly operationalise this construct, and future research should develop and validate measures of perceived institutional commitment, trust, and curricular reliability.

5.5. Implications for research and theory

Future research should distinguish more carefully among optional, selective, and compulsory mobility and between short-term, semester-long, blended, and virtual formats. Experimental vignette studies could vary funding, recognition guarantees, flexibility, and compulsion while holding programme quality constant. Longitudinal studies could measure attitudes before enrolment, before departure, during mobility, and after recognition decisions. Larger samples would permit country, discipline, and student-background comparisons and confirmatory validation of the scales developed here.

Theoretically, the findings suggest that embedded mobility should be analysed at the intersection of *Internationalisation of the Curriculum*, student agency, and institutional

trust. *Transformative learning* may explain the perceived value of intercultural experience, while *curriculum theory* explains alignment; neither is sufficient without attention to who bears the risks of participation. A *theory of embedded mobility* therefore needs to incorporate both learning design and distributive responsibility.

5.6. Implications for institutional practice

Programme coordinators and curriculum designers should establish mobility pathways before recruitment. This includes mapping equivalent modules, learning outcomes, workload, assessment, and credit recognition; publishing the mobility sequence and available destinations; and ensuring that mobility does not extend programme duration. Learning agreements should be pre-approved, and recognition decisions should follow clear timelines with transparent appeal routes.

International-relations offices should provide a single, accessible information pathway across the full lifecycle. Pre-departure guidance should include academic expectations, funding schedules, accommodation, accessibility, insurance, visa requirements, and points of contact. During mobility, students need rapid academic and administrative escalation routes. After mobility, dedicated staff should support recognition and reintegration rather than transferring coordination burdens to individual students.

University leadership should resource embedded mobility as core educational provision. Staffing, digital systems, contingency funding, disability support, and partner coordination cannot depend entirely on temporary projects. Institutions should monitor participation, withdrawal, delayed progression, and recognition outcomes, disaggregated where ethically and legally appropriate, to identify whether compulsory mobility creates unequal effects.

5.7. Implications for policy, funding, and quality assurance

Funding agencies and policymakers should align grants with real costs and provide funds before departure. Supplementary support is needed for students with disabilities, health needs, caring responsibilities, employment constraints, or destinations with high living costs. Programme rules should allow accessible alternatives, such as another destination, adjusted timing, short-term or blended formats, or equivalent internationalised learning, when physical travel is not feasible.

Quality assurance bodies should examine embedded mobility as part of programme design rather than as an auxiliary service. Relevant evidence includes automatic or pre-authorised recognition, curricular alignment, student information, financial planning, accessibility, alternative routes, complaints and appeals, and the monitoring of progression outcomes. A programme should not be considered inclusive merely because all students are formally required to participate.

5.8. Limitations and future directions

Several limitations delimit the findings. First, convenience and snowball sampling and the concentration of respondents in Romania restrict transferability. Future studies should use stratified multi-institutional samples and country-level comparisons. Second, exact fields of study and institutions were not collected. Subsequent surveys should include these variables because disciplinary structure and institutional capacity may influence mobility feasibility.

Third, responses were self-reported and cross-sectional. Social desirability, acquiescence, common-method variance, and self-selection may have contributed to the favourable pattern. The embedded-mobility attitude items were all positively worded, and several showed ceiling effects. Future instruments should include balanced wording, more discriminating response options, behavioural intentions, and observed programme choices.

Fourth, the questionnaire was developed for the study and was not formally piloted. The attitude scale showed an interpretable one-factor exploratory structure, but the barrier scale did not demonstrate a stable unidimensional structure. Independent samples should be used for cognitive testing, item refinement, and confirmatory factor analysis. Barrier domains should be modelled separately rather than assumed to form a single construct.

Fifth, only 57 respondents had previous mobility experience. This restricted statistical power and prevented stable multivariable or mediation modelling. Larger mobile samples and longitudinal designs are needed to test temporal relations among support, perceived impact, valuation, and later programme choice.

Sixth, qualitative data consisted of written survey comments rather than interviews or focus groups. They clarified reasons and conditions but did not permit probing or sustained exploration of contradictory views. Future qualitative research should examine students enrolled in programmes with actual compulsory mobility, especially those who postpone, decline, or seek alternatives.

Finally, the optional-versus-embedded comparison was hypothetical. Programme A was not rated independently, and respondents were not randomly assigned to programme conditions. Experimental comparisons and studies of actual enrolment and persistence are required before concluding that embedded mobility is preferred to optional mobility.

6. Conclusions

Students in this study generally regarded *curriculum-embedded physical mobility* as an attractive feature of higher education programmes. Previously mobile students reported strong academic, intercultural, linguistic, and transversal-skill value, while respondents across the sample associated embedded mobility with networks, cultural experience, coherent learning, and programme appeal.

This favourable pattern was conditional. Costs, complex procedures, programme compatibility, recognition, and limited guidance remained prominent concerns. Students' explanations showed that a mandatory international period is credible only when institutions make the requirement foreseeable, adequately funded, academically recognised, and flexible enough to accommodate legitimate constraints.

The findings do not establish that embedded mobility is superior to optional mobility or that institutional support causes acceptance. They instead show that educational value and institutional feasibility are jointly relevant to how students evaluate a compulsory mobility model. Embedded mobility should therefore be approached not as an inherently inclusive innovation, but as a curricular commitment whose legitimacy depends on coherent design, equitable access, and dependable institutional practice.

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Supplementary Material

The attractiveness of curriculum-embedded mobility in higher education: students' perspective

Alexandru Carțiș and Romiță Iucu

This supplementary file contains detailed sample distributions, measurement documentation, exploratory factor-analysis results, procedural clarifications, and the complete questionnaire administered in the study.

S1. Countries of origin and study

Table 1. Country of origin ($n = 134$)

Country	n	%
Romania	84	62.7
Cyprus	8	6.0
France	6	4.5
Greece	6	4.5
Germany	4	3.0
Iran	4	3.0
Türkiye	4	3.0
Spain	3	2.2
Poland	2	1.5
Switzerland	2	1.5
Syria	2	1.5
Austria	1	0.7
Belgium	1	0.7
Cameroon	1	0.7
Italy	1	0.7
Japan	1	0.7
Jordan	1	0.7
Lebanon	1	0.7
Moldova	1	0.7
Slovenia	1	0.7

Table 2. Country of study ($n = 134$)

Country	n	%
Romania	86	64.2
Cyprus	8	6.0
France	6	4.5
Greece	5	3.7
Belgium	4	3.0
Türkiye	4	3.0
Austria	3	2.2
Germany	3	2.2
Iran	3	2.2
Czech Republic	2	1.5
Italy	2	1.5
Poland	2	1.5
Switzerland	2	1.5
Hungary	1	0.7
Spain	1	0.7
Sweden	1	0.7
United Kingdom	1	0.7

S2. Measurement documentation

Table 3. Composite measures used in the analysis

Measure	Items	Respondents	Response format	Example item	α	ω
Programme-competence fit	3	All respondents	1 = strongly disagree to 5 = strongly agree	"The study programme I currently pursue provides me the competences needed for the desired job."	.76	.76
Mobility valuation	6	Previous mobility only	1 = strongly disagree to 5 = strongly agree	"Academic mobility has had a positive impact on my academic pathway."	.77	.79
Institutional-support satisfaction	8	Previous mobility only	1 = very dissatisfied to 5 = very satisfied	"Support services provided by your institution in terms of reintegration and academic credit recognition."	.83	.83
Personal-professional impact	7	Previous mobility only	1 = not at all to 5 = to a very large extent	"To what extent did mobility contribute to your overall personal growth and development?"	.86	.87
Embedded-mobility attitude	10	All respondents	1 = strongly disagree to 5 = strongly agree	"Including embedded mobility in a programme increases its appeal to me."	.81	.82
Importance of enrolment factors	12	All respondents	1 = not important at all to 5 = extremely important	"Academic credit transfer: the opportunity to integrate credits acquired in international learning experiences in your diploma."	.82	.83
Perceived barriers	13	All respondents	1 = strongly disagree to 5 = strongly agree	"High programme costs and living expenses."	.71	.71

Note. All composites were calculated as item means. Higher values indicate more of the named construct. The embedded-mobility attitude items were all positively worded. The barrier index is used as a broad exploratory summary; item-level results remain primary.

S3. Exploratory dimensionality checks

Principal-axis factoring was used. Factorability was assessed with the Kaiser–Meyer–Olkin statistic and Bartlett's test. Factor retention used 95th-percentile parallel analysis and a sequential stopping rule. Oblique rotation was planned for multi-factor solutions but was not required for the retained single-factor solutions.

For the embedded-mobility attitude items, KMO = .81 and Bartlett's $\chi^2(45) = 369.45$, $p < .001$. Parallel analysis retained one factor.

Table 4. One-factor principal-axis solution for embedded-mobility attitude items ($N = 134$)

Item	Loading	Communality
Including embedded mobility increases programme appeal	.614	.378
Offers a coherent and innovative learning experience	.573	.329
Improves the combination of theory and practice	.515	.265
Facilitates in-depth cultural experience	.501	.251
Appears easy to integrate into programme structure	.392	.153
Supports application of learning in real-world situations	.609	.371
Helps overcome barriers to traditional mobility	.565	.319
Improves access to the international labour market	.523	.273
Develops a sense of belonging to a global community	.692	.479
Expands professional or academic networks	.618	.382

For the barrier items, KMO = .65 and Bartlett's $\chi^2(78) = 275.35$, $p < .001$. The 95th-percentile parallel analysis retained one factor under the sequential criterion. Loadings and communalities indicated only a

modest common dimension, particularly for programme costs. The broad composite should therefore be interpreted cautiously.

Table 5. One-factor principal-axis solution for perceived-barrier items (N = 134)

Item	Loading	Communality
Linguistic barriers	.403	.162
Adaptation to new cultural environments	.507	.257
Compatibility between home and host programmes	.361	.130
Application complexity and access to information	.446	.199
Limited support and guidance	.335	.112
Homesickness and social isolation	.437	.191
Visa and legal requirements	.335	.112
Differences in academic calendars	.388	.150
Safety and health concerns	.498	.248
Cultural misunderstandings and stereotypes	.572	.327
High academic demands and expectations	.350	.123
Combining study with travel and exploration	.358	.128

S4. Complete questionnaire

The following section reproduces the questionnaire administered through QuestionPro. Formatting has been adapted for documentary presentation, but item wording and response options are retained.

Hello: You are invited to participate in our research "Embedded Mobility in Higher Education: Students' Perceptions".

In this analysis, several students from different European higher education institutions will be asked to complete a survey that investigates their perceptions about embedding international academic mobility experiences in study programmes curriculum (at bachelor, master, and doctoral levels) starting from their mobility experience and perceptions.

It will take approximately 30 minutes to complete the questionnaire.

Your participation in this study is completely voluntary. There are no foreseeable risks associated with this project. However, if you feel uncomfortable answering any questions, you can withdraw from the survey at any point. It is very important for us to learn your opinions.

Your survey responses will be strictly confidential and data from this research will be reported only in the aggregate. Your information will be coded and will remain confidential.

If you have questions at any time about the survey or the procedures, you may contact the research team by email at the following email address: alexandru-mihai.cartis@unibuc.ro.

Thank you very much for your time and support!

Risks and benefits

The risks associated with the present study are minimal from all perspectives. There are not direct benefits that may result from participating in this study, excepting direct contribution to important research for developing educational offerings. We cannot and we do not guarantee or promise that you will receive any material benefit, or of another kind, by participating in this study.

Participants rights

If you have read this introduction and decided to participate in this study, we are kindly asking you to understand that your participation is fully voluntary and you have the right to withdraw your consent or to stop your participation at any time, without any penalties or limiting any of the benefits that would normally be included. The alternative is not to participate. You have the right to refuse to reply to some of the questions. The study results will be presented in scientific or professional meetings and/or will be published in scientific journals and/or publications. Your privacy will be ensured in all data processing steps without any exceptions. The researchers are committed to ensure full anonymity of all participants and to ethically and responsibly manage all data collected through this survey.

GDPR

According to Regulation (EU) 2016/679 of the European Parliament and of the Council on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), the researchers are obliged to safely manage and solely for the mentioned purposes the data you will provide in the present study, such as socio-demographic information and the replies to the survey.

Confidentiality

Identification data may be removed from the private identification data, and, after such a removal process, the data provided in the survey may be used for future studies and be distributed to other researchers for future research, without firstly requesting any specific consent from your side in this regard.

Consent

By clicking on the button below, you acknowledge that your participation in the present study is fully voluntary, you agree to the above-mentioned terms and conditions, you are at least 18 years of age, and

you acknowledge that you can withdraw from the present study at any time and by any reason.

1. I agree, the study can begin (the survey will continue)
2. I don't agree, I don't wish to participate in this study (the survey will close)

Demographic information

In the present section of the survey, we will ask for a series of demographic data that support the analysis of patterns and similarities across age groups, gender, country of origin, parents' education level, and other information.

What age group do you belong to?

Please consider your age at the time of completing this survey.

1. 18-22 years
2. 23-28 years
3. 29-35 years
4. 36-45 years
5. 46-55 years
6. 56 years or above
7. I don't want to answer

What is your gender?

1. Female
2. Male
3. I don't want to answer
4. Other _____

What is your country of origin?

Please write down the name of your country of origin.

In what country do you study at this moment?

Please write down the name of the country where you study at this moment.

Do you belong to any or more of the following categories?

Please select one or more of the following categories that fit with your current situation.

1. Members of minority ethnic communities
2. Young people above 18 years old that leave the child state protection system
3. People with disabilities
4. Single family carers
5. People from rural areas seeking employment
6. People released from detention
7. Elderly people seeking employment
8. None of these categories
9. I prefer not to answer
10. Other _____

What is your parents' highest education level?

Please select the higher education level achieved by each of your parents.

	None	Primary school	Lower secundar	Upper secundar	Bachelor's degree	Postgraduate	I prefer not to
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			y school	y school		studies	answer
Mother	☐	☐	☐	☐	☐	☐	☐
Father	☐	☐	☐	☐	☐	☐	☐

What is your current employment status?

Please select all options that better describe your current employment status.

1. Full-time equivalent job
2. Part-time equivalent job
3. Own business / freelancer
4. Work in NGO / NPO
5. Unemployed
6. Other _____

Which of the following statements better describe your job intentions after graduation?

1. I intend to change my job with another from the same field.
2. I intend to change my job with another from a different field.
3. I don't intend to change my job after graduation.
4. Other _____

What is your current family situation?

Please select all options that better describe your current family situation.

1. Married, without children
2. Married, with one or more children
3. Not married, without children
4. Not married, with one or more children
5. Single parent with one or more children
6. I prefer not to answer
7. Other _____

Information about educational / academic record

In the current section of the survey, we will ask for a series of data about your educational / academic route and other related information, to support us contextualise the data analysis based on educational / academic records and characteristics.

What is the level of the study programme you are enrolled in at this moment?

Please select the level of the study programme you are currently pursuing. In case you are enrolled in more than one programme, please consider highest level programme or the most representative programme for this study from your point of view.

1. Bachelor's degree
2. Master's degree
3. Doctoral / Ph.D. degree
4. Postdoctoral studies
5. Other postgraduate studies
6. I am not a student at this moment (the survey will close)

Did you pursue the bachelor's degree in the same field of study as the current programme or in a different field?

1. In the same field of study
2. In a different field of study

In what year of study are you currently enrolled?

Please refer to the 2023-2024 academic year

1. I
2. II
3. III
4. IV

5. VI
6. VI
7. Other _____

What is the financial format of your study programme?

1. I have a scholarship
2. The programme / university does not require fees
3. I pay tuition fees
4. Other _____

To what extent do you agree with the following statements?

	Strongly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Strongly agree
The study programme I currently pursue provides me the competencies needed for the desired job.	☐	☐	☐	☐	☐
There is room for improvements in the contents of the study programme I currently pursue.	☐	☐	☐	☐	☐
My academic pathway till now provides me the competencies needed for the desired career.	☐	☐	☐	☐	☐
There is a significant discrepancy between the academic offer and the labour market needs in my field.	☐	☐	☐	☐	☐
Higher education studies are essential to achieve the competencies needed in my field.	☐	☐	☐	☐	☐
The format of the study programmes I followed respond to the training needs in my field.	☐	☐	☐	☐	☐

What do you intend to do after graduating from the current study programme?

In case you consider that more than one option describes your situation, please select the most important option OR the option closest in time after graduation.

1. Apply to a new study programme, in the same field of study.
2. Apply to a new study programme, in a different field of study.
3. Find a job in the same field of study.
4. Find a job, regardless of the field.
5. Take some time off from study or work.
6. I encounter difficulties deciding what to do next.
7. I did not decide yet.
8. None of the options above.

Information about your academic mobility experience

In the current section of the survey, we will ask for a series of data about your experience in participating in academic mobility experiences, as well as connected information.

During current or past higher education studies, did you take part in academic mobility experience(s)?

1. Yes
2. No

What type and length of mobility did you undertake during your studies?

In case you undertook several mobility opportunities, please select all relevant options below.

1. 1-semester long mobility
2. 1-year long mobility
3. Short-term mobility (less than 1 semester)
4. Other _____

In what country(ies) did your mobility took place?

In case you undertook several mobility opportunities, please mention all countries.

When did you return from your last mobility?

Please mention the date when you returned home from your last mobility experience.

• _____

How did you fund your mobility opportunity(ies)?

In case you undertook several mobility opportunities, please choose all relevant options below.

1. Erasmus+;
2. DAAD
3. Fullbright
4. Horizon
5. Self-funded
6. Private sponsors
7. Other _____

To what extent do you agree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
If I had the possibility / chance, I would undertake a new mobility in the next period.	☐	☐	☐	☐	☐
Academic mobility has had a positive impact on my academic pathway.	☐	☐	☐	☐	☐
Academic mobility has had a positive impact on my professional pathway.	☐	☐	☐	☐	☐
Academic mobility has significantly contributed to the development of transversal skills (e.g., communication, teamwork, problem-solving).	☐	☐	☐	☐	☐
Academic mobility exposed me to a rich intercultural context.	☐	☐	☐	☐	☐
Academic mobility significantly improved my foreign language skills.	☐	☐	☐	☐	☐

Overall, how satisfied are you with your academic mobility experience(s)?

1. Very Unsatisfied
2. Unsatisfied
3. Neutral
4. Satisfied
5. Very Satisfied

How satisfied are you with the following aspects related to your academic mobility experience(s)?

	Very dissatisfied	Not satisfied	Neutral	Satisfied	Very satisfied
Level of support and counselling you received during the mobility experience(s)	☐	☐	☐	☐	☐
Support services provided by your institution in terms of pre-departure guidance and preparation (before the mobility taking place)	☐	☐	☐	☐	☐
Support services provided by your institution during the mobility (e.g., addressing academic	☐	☐	☐	☐	☐

concerns, resolving administrative issues)					
Support services provided by your institution in terms of reintegration and academic credit recognition (after the mobility)	☐	☐	☐	☐	☐
Level of support you received from your institution throughout your entire academic mobility experience (before, during, and after)?	☐	☐	☐	☐	☐
Courses and programmes offered by the host institution	☐	☐	☐	☐	☐
Social and cultural integration activities and events offered during your mobility experience(s)	☐	☐	☐	☐	☐

To what extent did your academic mobility experience(s)...

Please consider the direct impact of your mobility experience(s) on each of the aspects mentioned below.

	Not at all	To a little extent	Somewhat	To a large extent	To a very large extent
contribute to your overall personal growth and development?	☐	☐	☐	☐	☐
immerse you in the local culture?	☐	☐	☐	☐	☐
improve your intercultural competences (i.e., your ability to interact effectively with people from different cultures)?	☐	☐	☐	☐	☐
cause you to see the world from a different perspective?	☐	☐	☐	☐	☐
contribute to your professional career perspectives?	☐	☐	☐	☐	☐
improve your linguistic and communication skills?	☐	☐	☐	☐	☐
improve your ability to adapt to new environments and challenging situations?	☐	☐	☐	☐	☐

How valuable was the experience to collaborate with international colleagues during the academic mobility?

1. Not at all valuable
2. Slightly valuable
3. Moderately valuable
4. Very valuable
5. Extremely valuable

Were your academic mobility experiences integrated into the curriculum of your study programme?

1. Yes
2. Sort of
3. No

Could you please elaborate on this (integration of mobility experience(s) into the curriculum of your study programme)? What happened and how?

Which of the following situations best describes your experience related to academic mobility?

1. I have applied for one or more mobility grants, but I was not selected.
2. I was selected for one or more mobility grants, but I did not manage to go.
3. I had the intention to apply for one or more mobility grants, but I never applied.
4. I never intended to apply for any mobility grant.
5. Other _____

What are the main reasons for not taking part in an academic mobility experience?

Please select all options below that best describes your situation (not more than 5 options).

1. Lack of financial resources
2. Requirements or restrictions of the desired programmes / courses
3. Lack of awareness related to existing opportunities
4. Professional / family engagements and/or responsibilities
5. Linguistic barriers
6. Concerns about successfully transferring credits or completing coursework abroad
7. Low interest in international learning experiences
8. Lack of institutional communication related to mobility opportunities
9. High bureaucratic processes
10. Matters related to safety and security in a foreign country
11. Difficulty in obtaining visa or other necessary travel documents
12. Other _____

Which of the following aspects would raise the probability for you to consider undertaking an academic mobility experience in the future?

Please select all options below that best describes your situation (not more than 3 options).

1. Scholarships and financial grants
2. Clear guidance regarding the content of the courses / study programmes
3. Support in successfully finalising the mobility
4. Raising awareness and information regarding available opportunities
5. Flexible academic requirements that can support students to participate in mobility
6. Linguistic support and/or language classes
7. Focus on specific fields of study or research opportunities available through mobility programmes
8. Access to diverse and inclusive environments
9. Integration of mobility experiences into the curriculum of your study program at your home institution
10. Other _____

How important do you think it is for universities to integrate (embed) academic mobility experiences directly into study programs, ensuring automatic recognition of credits and learning outcomes?

1. Not important at all
2. Slightly important
3. Somewhat important
4. Important
5. Extremely important

Students' perception on embedded mobility

In the current section of the survey, we want to analyse the students' perception on embedded mobility in study programmes, based on some parameters considered in this regard.

What is embedded mobility?

Embedded mobility refers to a learning experience that integrates physical mobility into the curriculum of a study programme or other educational activity (courses, short-term programmes, micro-credentials, etc.). This experience becomes an essential component for successfully completing the programme and obtaining the relevant diploma/certification.

Embedded mobility experiences can be short-term (1 week to 3 months) or long-term (1-2 semesters).

Programmes with embedded mobility experiences require all students to participate. The degree of administrative and academic support for these programmes is typically high.

Embedded mobility example

This is an example of how embedded mobility could be implemented in a master's programme with 4 semesters.

Students typically complete semesters 1 and 4 at their home university. Semester 2 offers flexibility, allowing students to choose between studying at their home university or a partner university (as specified by the programme). This decision is acknowledged by the student during application. To ensure an international learning experience, semester 3 follows a set structure: if semester 2 is spent at the home university, semester 3 must be completed at a partner university. Conversely, if semester 2 takes place at a partner university, then semester 3 can be completed at either the home university or another partner university (details outlined in the program description).

Regardless of the chosen combination, all students will spend at least one semester (25%) studying at a different university, fostering intercultural understanding, and broadening their academic network.

In your opinion, how does embedded mobility, where international study is a mandatory part of the curriculum, differ from classical/traditional mobility programmes, where international experiences might be optional or separate from the curriculum?

When considering the differences, you might think about factors such as programme structure, learning outcomes, student support, etc.

To what extent do you agree with the following statements?

	Strongly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Strongly agree
Including embedded mobility in a programme increases its appeal to me.	☐	☐	☐	☐	☐
Embedded mobility offers more coherent and innovative learning experiences compared to classical/traditional mobility programmes.	☐	☐	☐	☐	☐
Embedded mobility ensures a better theory and practice combination.	☐	☐	☐	☐	☐
Embedded mobility facilitates access to in-depth cultural experiences.	☐	☐	☐	☐	☐
Embedded mobility seem easy to integrate into the overall programme structure.	☐	☐	☐	☐	☐
Embedded mobility can help apply classroom learning to real-world situations.	☐	☐	☐	☐	☐
Embedded mobility supports overcoming barriers encountered in participating in classical/traditional mobility programmes.	☐	☐	☐	☐	☐
Embedded mobility ensures increased chances of insertion in an international labour market.	☐	☐	☐	☐	☐
Embedded mobility contributes to the development of a sense of belonging to a global community.	☐	☐	☐	☐	☐
Embedded mobility expands professional and/or academic networks.	☐	☐	☐	☐	☐

Imagine you had the opportunity to participate in a master's programme with embedded mobility that perfectly aligns with your academic and professional interests. The programme offers a semester abroad at a partner university as mandatory part of the curriculum. Considering the learning goals and programme content, which country/university combination would be most attractive to you and why?

When making your selection, you might consider factors like university's expertise, research opportunities, specific courses offered, or cultural immersion opportunities.

What are the most important 3 factors that determine the chosen country/university combination?

Please select all items that describe your perspective on the matter, up to 3 options.

1. Programme/university prestige
2. Cultural environment
3. Cost of living and programme fees
4. Spoken language
5. Research opportunities
6. Course/programme offer
7. Support and guidance services
8. Level of accessibility and inclusion
9. Extracurricular activities offer
10. Internship/employment opportunities
11. Other _____

How would including embedded mobility in a study program likely affect the overall appeal of the program for you?

Please select one option from the following:

1. Embedded mobility would significantly increase the program's attractiveness.
2. Embedded mobility would somewhat increase the program's attractiveness.
3. Embedded mobility would have no impact on the program's attractiveness.
4. Embedded mobility would somewhat decrease the program's attractiveness.
5. Embedded mobility would significantly decrease the program's attractiveness.

Could you please elaborate your choice?

In your opinion, how important are the following factors in deciding to enrol in study programmes with embedded mobility?

	Not important at all	Slightly important	Somewhat important	Important	Extremely important
Career Advancement: The potential impact of embedded mobility on future job opportunities and acquiring valuable skills relevant to professional aspirations.	☐	☐	☐	☐	☐
Academic Opportunities: The opportunity to access specialist courses, research facilities, or learning resources that are more difficult to access	☐	☐	☐	☐	☐

normally.					
Personal Development: Achieving new levels of self-knowledge and increased confidence by overcoming new challenges.	☐	☐	☐	☐	☐
Intercultural Competences: The opportunity to develop communication skills and adaptability in intercultural environments, crucial for navigating varied global contexts.	☐	☐	☐	☐	☐
Practical Application of Knowledge: The opportunity to apply theoretical knowledge in real-world contexts and gain practical experiences in the field of interest.	☐	☐	☐	☐	☐
Academic Credit Transfer: The opportunity to integrate credits acquired in international learning experiences in your diploma.	☐	☐	☐	☐	☐
Travel and Exploration: The opportunity to discover new places and destinations, adding an element of adventure to your academic journey.	☐	☐	☐	☐	☐
International Collaboration: The possibility to cooperate in carrying out projects, research, or team tasks with colleagues from different countries.	☐	☐	☐	☐	☐
Personal Interest: Aligning the features of the learning experience with one's own interests, hobbies and/or passions.	☐	☐	☐	☐	☐
Academic Mentoring: Access to mentoring and guidance from experienced teachers during your mobility.	☐	☐	☐	☐	☐
Cost and Financial Considerations: The affordability of the programme, including tuition, living expenses, and any available financial support.	☐	☐	☐	☐	☐
Language Acquisition: The possibility of improving language skills through contact with environments where a different language is spoken.	☐	☐	☐	☐	☐

To what extent do you agree or disagree the following factors represent barriers / challenges to participating in programmes with embedded mobility?

	Strongly disagree	Slightly disagree	Neither agree nor disagree	Slightly agree	Strongly agree
High programme costs and living expenses	☐	☐	☐	☐	☐
Linguistic barriers	☐	☐	☐	☐	☐
Adaptation to new cultural environments	☐	☐	☐	☐	☐
Compatibility between study programmes at home and host universities	☐	☐	☐	☐	☐
Complexity of application procedures and access to information about course offerings at partner universities	☐	☐	☐	☐	☐
Limited support and guidance services	☐	☐	☐	☐	☐

"Homesick" feelings and social isolation	☐	☐	☐	☐	☐
Visa and legal requirements for travel (where applicable)	☐	☐	☐	☐	☐
Differences of academic calendar	☐	☐	☐	☐	☐
Concerns related to safety and health matters	☐	☐	☐	☐	☐
Cultural misunderstandings and stereotypes	☐	☐	☐	☐	☐
Too high academic rigors and expectations	☐	☐	☐	☐	☐
Challenges of combining studying with travel and exploring new places	☐	☐	☐	☐	☐

Final considerations

Imagine you are considering two master's programmes in your field of study. Programme A offers a traditional mobility experience, where international study is optional. Programme B integrates embedded mobility, requiring a semester abroad at a partner university. Considering the learning experience and potential outcomes, how interested would you be in pursuing Programme B with embedded mobility if given the opportunity?

1. Not interested at all
2. Slightly interested
3. Somewhat interested
4. Very interested
5. Extremely interested

Imagine you are considering two master's programmes in your field of study. Programme A offers a traditional mobility experience, where international study is optional. Programme B integrates embedded mobility, requiring a semester abroad at a partner university. Considering the learning experience and potential outcomes, describe the added value and/or benefits you perceive from embedded mobility experiences compared to traditional, optional mobility programmes.

When considering added value, you might think about factors such as academic integration, cultural immersion, career preparation, or personal development.

Is there anything else you would like to share with us?

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Learning Approaches as Predictors of Lifelong Learning Dispositions in a Sample of Romanian Educational Sciences Students

Diana Estera STOIA*, Mariana CRAȘOVAN**

Abstract

This research examines the relationship between students' learning approaches (deep and surface) and their dispositions toward lifelong learning. The OECD (2024) identifies lifelong learning as a key competence for social, professional and economic participation in contemporary context. In a rapidly changing educational environment, where adaptability and continuous skill development are increasingly important, it is essential to understand the factors that positively influence students' inclination toward lifelong learning. This study pursued two main objectives: (1) to validate the assessment instrument developed by Kirby et al. (2010) for measuring lifelong learning dispositions in a Romanian context, and (2) to investigate the predictive value of learning approaches on the five dimensions that constitute lifelong learning dispositions (goal setting, application of knowledge and skills, self-direction and self-assessment, information seeking, and adaptation of learning strategies). The research was conducted on a sample of 155 students from the Department of Educational Sciences at the West University of Timișoara. The findings indicated that the deep approach was a significant positive predictor of lifelong learning dispositions, whereas the surface approach was a significant negative predictor. These findings highlight the importance of educational practices that promote deep approach to learning, thereby enhancing students' readiness to meet current and future societal demands. This study also contributes to the Romanian literature by providing preliminary evidence regarding the use of an instrument previously validated and used in international research.

Keywords: lifelong learning; learning approaches; lifelong learning competence; higher education; student development

* Master's degree in Educational Management and Curriculum Development, West University of Timișoara, Romania, diana.potra01@e-uyt.ro

** Associate Professor, Department of Educational Sciences, University Clinic of Therapies and PsychoPedagogical Counseling, West University of Timișoara, Romania. mariana.crasovan@e-uyt.ro



1. Introduction

Rapid social, economic and technological changes have substantially reshaped individuals' relationship with education and professional development. In contemporary society, the skills acquired through initial education are often insufficient for long-term adaptation to labour-market demands and the continuous evolution of knowledge. In this context, lifelong learning has become a critical necessity, enabling individuals to continuously update their knowledge and skills in response to evolving societal demands (OECD, 2024). Against this backdrop, lifelong learning has become an objective of international education policy, representing a prerequisite for active engagement in professional and social life (OECD, 2024; UNESCO, 2022).

Lifelong learning is defined as the continuous, voluntary and intentional development of knowledge, skills and competencies in formal, non-formal and informal contexts (European Commission, 2001; Laal, 2011). Beyond participation in educational programmes, it also involves a sustained orientation toward self-directed learning, intellectual autonomy and a willingness to continuously adapt. However, despite its widespread use, lifelong learning remains a complex and multifaceted concept, encompassing diverse educational, social and economic dimensions (James, 2020). Consequently, the emphasis shifts from the mere accumulation of information to individual's capacity to learn effectively over time and respond flexibly to new situations.

In a university setting, this perspective has significant implications. Universities can no longer be viewed as institutions responsible for transmitting specialised knowledge; rather, they play a crucial role in fostering students' capacity for continuous learning and adaptation. In this sense, lifelong learning requires the development of transferable competences, including self-regulation, motivation and strategic learning abilities (Matsumoto-Royo et al., 2022). Accordingly, Candy (1994) and Knapper and Cropley (2000) emphasise that one of the central functions of the contemporary university is to develop students' ability to 'learn how to learn', enabling them to continue learning throughout their lives. This shift in focus highlights the importance of understanding not only what students learn, but also how they engage with learning processes over time. Consequently, the notion of lifelong learning dispositions has emerged as a key framework for examining individuals' readiness and capacity for continuous learning (Deveci, 2022).

The literature conceptualises dispositions toward lifelong learning through characteristics such as setting learning goals, applying knowledge in new contexts, self-direction and self-assessment, identifying relevant information and adapting learning strategies (Kirby et al., 2010). These dimensions reflect an individual's capacity to remain actively engaged in personal development and to transform educational experiences into resources for future progress, being closely linked to adaptability in changing learning contexts (Deveci, 2022). One relevant factor in the development of these dispositions is the learning approaches adopted by students. According to the model proposed by Biggs

et al. (2001), the deep approach involves an intention to understand academic content, make conceptual connections and use complex cognitive strategies. It is associated with intrinsic motivation and genuine engagement with the academic task, as well as with higher levels of self-regulation and metacognitive awareness, which are essential for lifelong learning (Matsumoto-Royo et al., 2022).

In contrast, the surface approach involves rote memorisation, focusing on minimum requirements and immediate results, and is primarily associated with extrinsic motivation and the avoidance of cognitive effort. Numerous studies have shown that the deep approach is associated with learning autonomy, critical thinking, self-regulation and adaptability, all of which are important for lifelong learning (Barros et al., 2013; Kirby et al., 2010, Holford, 2022). Conversely, the surface approach has been associated to lower levels of these characteristics and limited engagement in ongoing personal and professional development (Asikainen & Gijbels, 2017; Smarandache et al., 2021). This issue is particularly relevant for students in educational sciences, as future teachers must demonstrate initial professional competencies and a willingness to continuously improve, reflect critically, and adapt to changes in the educational system. Teachers who are committed to lifelong learning are better equipped to adopt innovative practices, respond to student diversity, and contribute to institutional development (Day & Gu, 2010; Shin, 2019).

Despite the relevance of the topic, empirical research conducted in Romania on the relationship between learning approaches and lifelong learning dispositions remains limited. Furthermore, there is a growing interest in adapting and validating international measurement instruments across different cultural contexts. In this regard, the present study had two main objectives: (1) to examine the psychometric properties of the scale developed by Kirby and colleagues (2010) on a Romanian sample, and (2) to investigate the predictive relationship between students' learning approaches and their dispositions toward lifelong learning.

These findings may contribute to a better understanding of the psychoeducational factors associated with lifelong learning and may inform university educational interventions aimed at promoting deep approaches to learning and competencies relevant necessary to long-term professional development.

Theoretical framework

Lifelong learning as a contemporary educational goal

The concept of lifelong learning occupies a central place in current educational policies as it is linked to the need for continuous adaptation to economic, social and technological changes. International organisations emphasise that the sustainable development of contemporary societies depends on individuals' ability to learn continuously, update their skills and respond flexibly to ever-changing professional contexts (OECD, 2024; UNESCO, 2022).

The European Commission (2001) defines lifelong learning as any learning activity undertaken throughout life with the aim of improving knowledge, skills, and qualifications. This perspective extends beyond formal education to include learning experiences gained in non-formal and informal settings, including professional activities, community involvement, and family life. Similarly, UNESCO (2022) emphasises the continuous and inclusive nature of the learning process from childhood to old age.

In the literature, lifelong learning is analysed as both participation in educational activities and a stable psychological orientation towards personal and professional development. Laal (2011) demonstrates that individuals who are constantly engaged in the learning process exhibit higher levels of adaptability, autonomy, and personal responsibility. From this perspective, emphasis is placed not only on access to education, but also on individuals' willingness to continue learning actively and independently.

For higher education institutions, this concept implies a paradigm shift. The contemporary university can no longer be viewed merely as a space for transmitting disciplinary knowledge; it must also become a context that fosters students' ability to learn independently and sustainably. Candy (1994) and Knapper and Cropley (2000) argue that one of the central missions of higher education is to prepare students for unpredictable professional contexts where the ability to continuously update skills is paramount.

Dispositions toward lifelong learning

To capture the psychological dimension of lifelong learning, Kirby and colleagues (2010) propose the concept of dispositions for lifelong learning. This refers to an individual's relatively stable tendency to voluntarily engage in learning activities and capitalise on development opportunities.

The authors identify five main dimensions of this construct: Goal setting reflects a person's ability to formulate personal learning goals, plan and maintain the direction of their own development. Goal-oriented students tend to demonstrate initiative and intrinsic motivation. The second dimension, applying knowledge and skills, involves transferring knowledge to practical contexts and actively using acquired information to solve real-world problems. This dimension is essential in a society based on transferable skills. Self-direction and self-assessment entail taking responsibility for one's own learning, monitoring progress and adapting learning strategies based on outcomes. These are closely linked to self-regulated learning. Information seeking reflects information literacy skills, namely the ability to identify relevant, credible and useful sources in a complex information environment. Adapting learning strategies demonstrates cognitive flexibility and the ability to modify study methods based on task requirements, difficulty or context.

Together, these dimensions outline the profile of someone capable of managing their own development effectively and responding to the demands of a constantly changing society.

Students' learning approaches

An important theoretical framework for explaining how students approach academic tasks is the theory of learning approaches. Building on the research of Marton and Säljö (1976), Biggs (1987) and Biggs et al. (2001) developed a model in which academic performance depends on both cognitive abilities and how the student approaches the learning process.

In its current form, the model distinguishes two major approaches:

The Deep Approach involves the intention to understand the content being studied, identify relationships between concepts and integrate new information into prior knowledge. Students use higher-order cognitive strategies such as analysis, comparison, critical reflection and synthesis. The dominant motivation is intrinsic, based on a genuine interest in learning. This approach has been shown to lead to better academic performance, long-term retention of information and the development of critical thinking skills (Asikainen & Gijbels, 2017, Matsumoto-Royo et al., 2022).

The surface approach is characterised by rote memorisation, a focus on reproducing information and a predominant concern with meeting the minimum requirements of an assessment. Students aim to avoid failure rather than genuinely understanding the content. Motivation is primarily extrinsic and cognitive engagement is low. This approach has been associated with limited use of learning strategies, lower levels of self-regulation and reduced capacity to adapt learning to new contexts (OECD, 2024). While this approach may produce acceptable short-term results, it limits the transfer of knowledge and the development of complex skills (Biggs et al., 2001, OECD, 2024).

Learning approaches and lifelong learning dispositions

The literature consistently links how students learn to their long-term readiness for learning. Those who adopt a deep approach to learning tend to exhibit characteristics consistent with the profile of a person oriented towards lifelong learning, such as higher levels of autonomy, self-regulation, strategic flexibility and the practical application of knowledge (Kirby et al., 2010; Barros et al., 2013).

Evans et al. (2003) demonstrated that the deep approach is associated with a desire for knowledge and strategic flexibility — two factors that are important for long-term engagement in learning. Similarly, Smarandache et al. (2021) emphasise the importance of interest in subject matter and the conscious effort required to develop sustainable academic practices. In contrast, the surface approach is frequently negatively correlated with dispositions towards lifelong learning. Students who are predominantly oriented towards memorisation and immediate results tend to exhibit lower levels of critical reflection, adaptability and responsibility for their own development (Barros et al., 2013).

Relevance educational sciences students

The relationship between learning approaches and dispositions for lifelong learning is particularly important for students preparing for a teaching career. Teachers are

constantly confronted with curricular, technological and social changes, requiring them to constantly update their professional knowledge and practices. Day and Gu (2010) demonstrate that teachers who engage in lifelong learning are better equipped to adopt innovative practices and respond to student diversity. Similarly, Holford et al. (2022) emphasise that higher education must foster dispositions oriented towards reflection, autonomy, and continuous development.

Overall, the literature suggests that learning approaches are closely related to students' capacity for lifelong learning. However, empirical evidence on this relationship, particularly in the context of Romanian higher education, remains limited (Barros et al., 2013; Kirby et al., 2010; Matsumoto-Royo et al., 2022).

Consequently, examining how students in education learn and develop dispositions toward lifelong learning can provide valuable insights for the design of university programmes and the preparation of future teachers. In this context, the present study seeks to explore the extent to which students' learning approaches (deep and surface) predict their dispositions toward lifelong learning among Romanian university students.

2. Methodology

Research design

This study employed a quantitative, cross-sectional, correlational and predictive research design to investigate the relationship between students' learning approaches and their dispositions toward lifelong learning. This design allowed the examination of statistical associations between variables and the estimation of the predictive value of deep and surface approaches for overall orientation towards lifelong learning. In this study, the two learning approaches (the deep approach and the surface approach) were the independent variables. The dependent variable was disposition toward lifelong learning, analysed both at the global level and across its component dimensions.

Research objectives and hypotheses

The study pursued two main objectives. The first was to examine the psychometric properties of the instrument for measuring dispositions toward lifelong learning developed by Kirby and colleagues (2010) in a Romanian student sample. The second objective was to investigate the relationship between learning approaches and dispositions toward lifelong learning, and to test their predictive value.

Based on the literature, the following hypotheses were formulated:

Hypothesis 1: The deep approach would be positively and significantly correlated with dispositions toward lifelong learning.

Hypothesis 2: The surface approach would be negatively and significantly correlated with dispositions toward lifelong learning.

Two research questions were also examined:

1) To what extent does the deep approach predict dispositions toward lifelong learning?

2) To what extent does the surface approach predict dispositions toward lifelong learning?

Participants

The sample consisted of 155 students enrolled in bachelor's and master's programmes at the Department of Educational Sciences at the West University of Timișoara. Most participants were undergraduates (90.3%), while 9.7% were master's students. In terms of gender distribution, the sample was predominantly female (99.3%), which reflects the gender distribution typically observed in educational sciences programmes. In terms of age, most participants fell within the 18–23 age range (88.4%), followed by those aged 24–30 (7.7%), and those aged 31–40 (2.5%). Participants came from the following study programmes: Primary and Preschool Education, Pedagogy, Special Education and the Master's programme in Educational Management and Curriculum Development. This diversity provides valuable insight into the relationships between variables within the field of educational sciences.

Table 1

Demographic characteristics of participants (N = 155)

Characteristic	Category	N	%
Gender	Female	154	99.3
	Male	1	0.6
Age	18–23	137	88.4
	24–30	12	7.7
	31–40	4	2.5
Level of study	Bachelor's	140	90.3
	Master's	15	9.6
Year of study	Bachelor's – Year I	130	83.8
	Bachelor's – Year II	1	0.6
	Bachelor's – Year III	9	5.8
	Master's – Year II	15	9.6
Programme	Primary and Preschool Education	83	53.5
	Pedagogy	31	20
	Special Education	26	16.7
	Educational Management and Curriculum Development	15	9.6

Note. N = number of participants

Instruments

Lifelong learning dispositions scale

To assess dispositions for lifelong learning, the scale developed by Kirby et al. (2010) was used. The instrument consists of 14 rated on a five-point Likert scale ranging from 1

("strongly disagree") to 5 ("strongly agree"). The scale assesses five dimensions: Goal setting; Application of knowledge and skills; Self-direction and self-assessment; Information seeking; Adaptation of learning strategies.

In the present study, the overall internal consistency of the instrument was moderate ($\alpha = .65$), remaining slightly below the conventional .70 threshold. Although this value may be considered acceptable in exploratory research and in the context of cultural adaptation, it also suggests the need for further investigation of the scale's psychometric properties on larger and more diverse Romanian samples.

Revised Two-Factor Study Process Questionnaire (R-SPQ-2F)

Learning approaches were measured using the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F; Biggs et al., 2001), previously translated and adapted for Romanian students by Smarandache et al. (2021). The instrument includes 20 items rated on a five-point Likert scale ranging from 1 ("never") to 5 ("always") and assesses two dimensions: deep approach and surface approach.

In the present study, internal consistency was high for the deep approach ($\alpha = .82$) and satisfactory for the surface approach ($\alpha = .80$).

Data collection procedure

Data were collected through paper-based and online administration of the instruments to facilitate participation by students from different programmes and years of study. Participants were informed of the general purpose of the research and were told that participation was voluntary and confidential. Questionnaire completion required approximately 10 minutes. All responses were collected anonymously, and incomplete responses were excluded from the final dataset.

Data analysis

Statistical analyses were conducted using JASP. To test the first objective, confirmatory factor analysis (CFA) was used to examine the fit of the instrument's proposed factorial structure for measuring dispositions towards lifelong learning. Pearson correlations coefficients were computed to examine the relationships between variables after verifying the assumption of normality. To assess the predictive value of learning approaches, simple linear regressions were conducted using the deep and surface approaches as predictors and overall disposition toward lifelong learning as the criterion variable. The main assumptions of the regression models were tested: normality of the residuals, linearity of the relationships, homoscedasticity and independence of the errors. Preliminary diagnostics indicated that the assumptions underlying these analyses were adequately met.

3. Findings

Descriptive statistics

Analysis of the descriptive statistics revealed moderate to high levels of dispositions toward lifelong learning among the participants. Among the assessed dimensions, the highest means were recorded for applying knowledge and skills ($M = 4.10$, $SD = 0.70$), followed by goal setting ($M = 3.56$, $SD = 0.51$) and self-direction and self-assessment ($M = 3.50$, $SD = 0.77$). The lowest values were observed for adapting learning strategies ($M = 3.12$, $SD = 0.69$) and information seeking ($M = 3.03$, $SD = 1.12$).

Table 2

Means and standard deviation for lifelong learning variables

Variable	N	Mean	SD
Goal setting	155	3.56	.51
Application of knowledge and skills	155	4.10	.70
Self-direction and self-assessment	155	3.50	.77
Information seeking	155	3.03	1.12
Adaptation of learning strategies	155	3.12	.69

Note. N= number of participants; SD= standard deviation

These findings suggest that students perceive themselves as relatively competent in the practical application of knowledge and in focusing on personal learning goals but report more moderate levels of strategic flexibility and autonomous information-seeking.

Regarding learning approaches, the mean for the deep approach was higher than that for the surface approach. Participants reported a moderate level of the deep approach ($M = 3.47$, $SD = 0.67$) compared to a lower level of the surface approach ($M = 2.41$, $SD = 0.70$). This pattern suggests a general orientation toward understanding and genuine engagement rather than rote memorisation or minimal compliance with academic demands.

Table 3

Means and standard deviation for learning approach variables

Variable	N	Mean	SD
Deep approach	155	3.47	.67
Surface approach	155	2.41	.70

Note. N= number of participants; SD= standard deviation

Validation of the Lifelong Learning Dispositions Scale

To test the structural validity of the instrument developed by Kirby and colleagues (2010), a confirmatory factor analysis was conducted on the 14 items organised into the five proposed theoretical dimensions.

The initial model indicated an acceptable-to-moderate fit to the data: $\chi^2 (77) = 166.598$, $p < .001$, CFI = .853, TLI = .826, RMSEA = .087, SRMR = .093.

Following an examination of the modification indices, three correlated residuals were specified. The revised model showed an improvement in fit indices: $\chi^2 (74) = 142.527$, $p < .001$, CFI = .887, TLI = .861, RMSEA = .078, SRMR = .083.

These results suggest that the factor model demonstrated a marginally acceptable fit in the Romanian sample and provide preliminary support for the use of the scale in future research on dispositions toward lifelong learning.

Table 4

CFA: Lifelong Learning Dispositions Model

Model	Model χ^2	p	df	CFI	TLI	RMSEA	SRMR
Lifelong learning dispositions (14 items – original model)	166.598	< .001	77	.853	.826	.087	.093
Lifelong learning dispositions (3 correlated item pairs)	142.527	< .001	74	.887	.861	.078	.083

Relationship between the deep approach and dispositions toward lifelong learning

To test the first hypothesis, the Pearson correlation coefficient was computed to examine the relationship between the deep approach and the overall disposition toward lifelong learning. The results indicated a positive, moderate and statistically significant correlation ($r = .440$, $p < .001$). Therefore, Hypothesis 1 was supported.

The coefficient of determination ($r^2 = .194$) shows that approximately 19.4% of the variation in the disposition towards lifelong learning is associated with variation in the deep approach.

Table 5*Pearson correlations between the deep approach and lifelong learning dispositions*

	Lifelong learning	r^2
<i>Deep approach</i>	0.440*	.194

This suggests that students who demonstrate a genuine interest in the subject matter, employ comprehension strategies and seek meaning in the learning process are more likely to be oriented towards lifelong learning.

Relationship between the surface approach and disposition toward lifelong learning

To test the second hypothesis, the Pearson correlation coefficient was computed to examine the relationship between the surface approach and the overall disposition toward lifelong learning. The results revealed a negative, moderate and statistically significant correlation ($r = -.406$, $p < .001$). Thus, Hypothesis 2 was supported. The coefficient of determination ($r^2 = .165$) indicates that approximately 16.5% of the variation in the disposition towards lifelong learning is associated with variation in the surface approach.

Table 6*Pearson correlations between the surface approach and lifelong learning dispositions*

	Lifelong learning	r^2
<i>Surface approach</i>	-0.406*	.165

This suggests that students who are predominantly oriented towards rote memorisation, avoidance of cognitive effort and focus on minimal requirements tend to exhibit lower levels of orientation toward lifelong learning.

Predictive value of the deep approach

To answer the first research question, a simple linear regression was conducted with the deep approach as the predictor and the overall disposition towards lifelong learning as the criterion variable. The model was statistically significant ($F(1, 153) = 36.718$, $p < .001$), explaining 19.4% of the variance in the dependent variable ($R^2 = .194$).

The regression coefficient indicated that the deep approach was a significant positive predictor of the disposition toward lifelong learning ($B = 0.292$, $SE = 0.048$, $\beta = 0.440$, $t = 6.059$, $p < 0.001$).

Table 7*Linear regression analysis predicting lifelong learning dispositions from the deep approach*

Predictor	B	ES	β	t	P	R ²
(Constant)	2.527	0.170	—	14.823	<.001	.194
Deep approach	0.292	0.048	0.440	6.059	<.001	

The results indicate that higher levels of the deep approach were associated with higher levels of dispositions toward lifelong learning.

Predictive value of the surface approach

To answer the second research question, a simple linear regression model was estimated with the surface approach as the predictor. The model was statistically significant ($F(1, 153) = 30.128, p < .001$), explaining 16.5% of the variance in the disposition towards lifelong learning ($R^2 = .165$). The regression coefficient showed that the surface approach was a significant negative predictor of the disposition towards lifelong learning ($B = -0.258, SE = 0.047, \beta = -0.406, t = -5.489, p < 0.001$).

Table 8*Linear regression analysis predicting lifelong learning dispositions from the surface approach*

Predictor	B	ES	β	t	P	R ²
(Constant)	4.165	0.118	—	35.240	<.001	.165
Surface approach	-0.258	0.047	-0.406	-5.489	<.001	—

Therefore, higher levels of the surface approach were associated with lower levels of disposition toward lifelong learning.

Synthesis of results

Overall, the results support the formulated hypotheses and confirm the relevance of learning approaches in explaining students' orientation towards lifelong learning. The deep approach emerged as a favourable learning orientation, whereas the surface approach appears to hinder the development of the dispositions necessary for lifelong learning. These findings emphasise the importance of promoting university learning environments that encourage genuine engagement, reflection and the self-regulation of learning.

4. Discussion

Interpretation of the main results

This study aimed to investigate the relationship between students' learning approaches and their dispositions toward lifelong learning. It also sought to examine the psychometric proprieties of the scale developed by Kirby and colleagues (2010) for use in a Romanian student sample. The results provide empirical support for both objectives, confirming the importance of learning approaches in explaining students' orientation toward lifelong learning continuous development.

First, confirmatory factor analysis indicated a marginally acceptable fit for the theoretical model of the lifelong learning dispositions scale. In addition, the internal consistency of the scale remained slightly below the conventional recommended threshold. Although these findings provide preliminary support for the use of the instrument with the present sample, the results should be interpreted with caution, particularly in the context of cultural and linguistic adaptation. Therefore, further validation studies on larger and more diverse Romanian samples are necessary.

Secondly, the results confirmed the existence of a significant positive relationship between deep approach and dispositions toward lifelong learning. Students who demonstrate a genuine interest in the subject matter, strive to comprehend the information and utilise sophisticated cognitive strategies tend to be more inclined towards self-directed learning, adaptation and ongoing personal growth. This suggests that adopting a deep approach may support immediate academic performance and fosters a positive orientation toward lifelong learning.

In contrast, the surface approach was negatively associated with dispositions toward lifelong learning. Students who predominantly rely on rote memorisation, focus on minimum requirements and avoid cognitive effort tend to exhibit lower levels of autonomy, reflection and openness to further development. This finding supports the view that superficial study strategies may limit the quality of current learning and motivation for lifelong learning.

Regression analyses reinforced these conclusions, highlighting that the deep approach is a significant positive predictor of dispositions for lifelong learning, while the surface approach is a significant negative predictor. In other words, students' approaches to learning are closely associated with their willingness to continue learning after graduation.

The present findings are consistent with previous research highlighting the connection between deep learning approaches and characteristics associated with lifelong learning. Specifically, students who adopt a deep approach tend to demonstrate higher levels of self-direction, application of knowledge and adaptability, which are core components of lifelong learning (Kirby et al., 2010; Barros et al., 2013). These results suggest that an orientation toward understanding and meaningful engagement in learning supports students' readiness for continuous learning.

In contrast, the negative predictive role of the surface approach identified in this study aligns with prior research indicating that rote memorisation and a focus on minimum requirements are associated with lower levels of engagement, reduced critical thinking and limited development of higher-order learning skills (Asikainen & Gijbels, 2017; Smarandache et al., 2021)..

Overall, these findings provide empirical support for the relationship between learning approaches and lifelong learning dispositions, highlighting the role of deep approach as a positive predictor and surface approach as a negative predictor within the Romanian higher education context.

Relevance for the training of future teachers

An important aspect of the research is the specific nature of the investigated sample, which consisted of students enrolled in educational sciences programmes. For this group, dispositions towards lifelong learning hold professional significance. Teachers are continually required to update their subject knowledge, teaching methods, digital competencies and assessment practices.

Therefore, the results suggest that promoting a deep approach from the beginning of teacher education can be a strategic investment in the quality of future teaching careers. Students who learn reflectively, autonomously and meaningfully are more likely to become reflective and adaptable teachers who are receptive to innovation, self-evaluation and continuous professional development.

Contribution of the study

This study makes several relevant contributions. Firstly, it provides empirical data on the relationship between learning approaches and lifelong learning dispositions in the underexplored context of Romanian higher education. Secondly, it supports the use of a culturally adapted international scale for assessing orientation toward lifelong learning. Thirdly, it demonstrates that pedagogical factors relating to how students learn can be significant explanatory factors in developing essential long-term competencies.

General implications

The research findings suggest that universities may influence not only immediate academic performance, but also students' readiness for further learning. Educational environments that encourage reflection, autonomy, problem solving and the practical application of knowledge can produce graduates who are better prepared for future professional and social changes. In this sense, the deep approach may be viewed as both an effective study strategy and a formative mechanism for building a culture of lifelong learning.

Practical implications

The study's findings emphasise the importance of designing university settings that encourage a deep approach to learning and reduce students' reliance on surface approach

strategies. Given that the deep approach was positively associated with a disposition for lifelong learning and the surface approach negatively, higher education institutions can intervene by organising educational experiences.

One area of focus is the teaching strategies employed in the classroom. Activities centred on problem solving, case studies, interdisciplinary projects, reflective portfolios and authentic tasks can encourage students to understand, apply and integrate knowledge rather than limiting themselves to memorisation. Such practices are conducive to the development of autonomy and critical thinking.

A second area concerns academic assessment. Assessment systems that rely solely on reproduction may encourage surface approaches, whereas formative assessment, constructive feedback and tasks requiring analysis, argumentation and knowledge transfer can support deep approaches to learning. The way exams and assessment criteria are designed can directly influence the learning style adopted by students.

Furthermore, these findings are relevant to academic advising and students' personal development. Early identification of tendencies toward surface approach enables the implementation of supportive interventions focused on self-regulation, time management, academic motivation and effective study strategies. This is particularly significant in the context of teacher training programmes. Promoting deep approaches to learning among future teachers can encourage a professional attitude oriented toward continuous improvement, pedagogical reflection and adaptation to changes in the educational system.

Limitations of the study

The results must be interpreted considering certain methodological limitations. Firstly, the sample consisted only of students from the Department of Educational Sciences at one Romanian university, which limits the generalisability of the findings to other universities and academic fields. In addition, students enrolled in teacher education programmes may present particular characteristics related to learning, motivation and professional development, which may have influenced the results of the study.

Secondly, the sample was almost exclusively female, reflecting the gender distribution typically found in educational sciences programmes. Therefore, the findings cannot be assumed to reflect the experiences or learning characteristics of the broader university student population.

Thirdly, the data were collected using self-report instruments. This type of measurement may be influenced by socially desirable responding, perceptual errors or the tendency of participants to evaluate themselves favourably.

Fourthly, the cross-sectional design of the study does not allow for firm causal conclusions. Although the regressions demonstrate statistical predictive value, the direction of causality of the investigated relationships cannot be stated with certainty.

In addition, the sample size may be considered relatively modest for confirmatory factor analysis, particularly given the number of items included in the instrument.

Although the obtained results provide preliminary support for the proposed factorial structure, larger samples would allow for more stable estimations and a more robust evaluation of the scale's psychometric properties.

Finally, the moderate internal consistency of the lifelong learning dispositions scale and the marginal CFA fit indices suggest the need for further examination of the instrument's psychometric properties in the Romanian context. Future studies should test the scale on larger and more diverse samples to provide stronger evidence regarding its validity and reliability.

Future research directions

Future research can build upon the current findings in several ways. One direction is to replicate the study with larger and more diverse samples drawn from multiple universities and academic fields. Comparing students from the social sciences, natural sciences, medicine and engineering fields could provide valuable insights into the specific characteristics of the relationship under investigation within different disciplines.

A second direction involves conducting longitudinal studies to track the evolution of learning approaches and lifelong learning dispositions throughout the university years. This would enable us to observe the extent to which academic experiences influence these variables.

A third direction is to test more complex predictive models that include variables such as academic motivation, self-efficacy, engagement with the university, satisfaction with one's studies and academic performance. It would also be useful to develop and culturally validate the instruments used, examining how the items function across different participant groups.

5. Conclusion

The present study highlights the close relationship between students' approaches to learning and their orientation toward lifelong learning and continuous development. The deep approach emerged as a positive predictor of lifelong learning dispositions, whereas the surface approach emerged as a negative predictor. These findings support the view that universities play an important role not only transmitting knowledge, but also in preparing graduates who can continue to learn autonomously, reflectively and adaptively after completing their studies. In a rapidly changing society, fostering an academic culture oriented toward deep approaches to learning may contribute to sustainable professional and social development.

AI Statement

DeepL was used for translation support during the preparation of the manuscript.

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Cross-Disciplinary Elective Courses in Initial Teacher Education: Developing Socio-Emotional and Pedagogical Competencies among Pre-Service Teachers

Adela CÎNDEA*, Gabriela DOMILESCU**

Abstract

Nowadays, teachers' socio-emotional competencies are recognized as fundamental for effective teaching and for creating a stimulating and supportive learning environment. The present study examines the impact of three cross-disciplinary elective courses —Effective communication and teamwork, Critical thinking and reflexivity, and Failure management and professional well-being— on the development of pre-service teachers' socio-emotional and pedagogical competencies. Adopting a convergent parallel mixed-methods design, the research integrates quantitative and qualitative approaches to capture both measurable trends and the experiential dimensions of the training process. The sample comprised 31 female students enrolled in initial teacher education programs at the West University of Timișoara, with each participant engaged in one of the three targeted disciplines. Data were collected through a structured questionnaire complemented by open-ended items aimed to explore students' subjective perceptions. Multiple linear regression analysis was employed as the primary analytical strategy to evaluate the collective predictive capacity of these disciplines. The exploratory regression model captured a substantial proportion of variance ($R^2 = 0.85$) in students' perceptions of their professional growth, though this high value is interpreted cautiously given the context-specific sample size. Quantitative findings underscore the prominent role of reflective thinking in perceived professional development, while qualitative evidence highlights the importance of collaborative learning tasks, applied exercises, and a psychologically safe learning environment. Overall, the study supports the deliberate integration of socio-emotional training into initial teacher education curricula, offering insights into pathways that support the holistic development of future educators.

Keywords: teacher education, cross-disciplinary elective courses, socio-emotional competencies, critical thinking, reflexivity, communication

* Ph. D., Associated professor, Teacher Training Department, Faculty of Psychology and Educational Sciences, West University of Timișoara, adela.cindea@e-uvt.ro

** Ph. D, Lecturer, Teacher Training Department, Faculty of Psychology and Educational Sciences, West University of Timișoara, gabriela.domilescu@e-uvt.ro



1. Introduction

In the contemporary educational landscape, the professional identity and effectiveness of educators are undergoing a significant paradigm shift. While traditional teacher training models have historically prioritized academic subject matter knowledge and pedagogical techniques, modern classrooms demand a more holistic approach to teacher education. Classrooms are inherently dynamic social and emotional ecosystems where instructional success is deeply intertwined with the psychological climate and the quality of interpersonal relationships. Consequently, initial teacher education must expand its scope beyond cognitive and methodological boundaries to integrate social, emotional, and transversal competencies as core pillars of professional readiness. Developing these competencies during the formative stages of initial training equips pre-service teachers with the intra- and interpersonal tools necessary to navigate complex educational realities, sustain long-term professional well-being, and mitigate the early onset of occupational burnout.

At the West University of Timișoara, undergraduate students are required to complete three cross-disciplinary elective courses outside their field of specialization to support the development of transversal competencies. As part of the project *Reflective and Collaborative Professionals: An Integrated Framework of Work-Based and Complementary Learning Activities Based on the Integration of Theory and Practice and the Use of Evidence in Decision-Making*, three elective courses were designed and implemented to strengthen the socio-emotional competencies of pre-service teachers preparing for careers in preschool and primary education.

Within this context, cross-curricular courses function as intentional pedagogical frameworks designed to cultivate skills that span across traditional domain boundaries. Rather than treating socio-emotional learning as a generic or secondary topic, integrating specific socio-emotional training modules allows for a structured exploration of foundational professional behaviors. This study focuses on three targeted cross-disciplinary elective courses: *Effective Communication and Teamwork*, *Critical Thinking and Reflexivity*, and *Failure Management and Professional Well-Being*. Each of these disciplines addresses a critical facet of the modern teacher's profile. Communication and teamwork provide the relational infrastructure required for classroom discourse and institutional collaboration; critical thinking and reflexivity foster the cognitive agility needed for adaptive instruction and evaluative judgment; and well-being and failure management establishes the emotional resilience necessary to cope with the inherent stressors of the teaching profession.

To provide a comprehensive exploration of these dynamics: we, firstly, examine the theoretical foundations of social-emotional teaching competencies and their broader impact on educational outcomes, secondly, we delineate the specific contributions of the three targeted cross-disciplinary elective courses to teacher education, and, finally, we conclude by contextualizing the empirical gaps in the current literature, which directly

articulate the central aim, research question, and operational hypotheses of this investigation.

Social – emotional teaching competencies

Since social-emotional learning is becoming a genuine component of quality education, the process must start in initial teacher education, through the systematic development of teachers' own socio-emotional competencies. Contemporary research increasingly demonstrates that effective teaching requires far more than subject knowledge and methodological skills; it also depends on teachers' ability to communicate empathically, think critically, regulate emotions, and maintain professional well-being. A growing body of research (Jennings & Greenberg, 2009; Reyes et al., 2012; Durlak et al., 2022; Gebre et al., 2025) supports the premise that teachers with well-developed socio-emotional competencies are more effective at fostering healthier, more resilient developmental outcomes among students.

In 2009, Jennings and Greenberg introduced the prosocial classroom model, arguing that teachers' social and emotional competencies, as well as their well-being, play a crucial role in shaping a prosocial classroom climate and influencing student outcomes. According to the authors, these competencies support more effective classroom management and facilitate the successful implementation of social and emotional learning within the curriculum. Teachers who possess strong socio-emotional skills are more likely to adopt a proactive approach, skilfully using their emotional expressions and verbal encouragement to foster students' enthusiasm and enjoyment of learning, while also guiding and regulating student behaviour. Teachers' emotional states influence students' motivation, interest, and academic engagement. Interest, in turn, stimulates curiosity and supports intrinsic motivation, fostering a genuine desire to learn (Ortega, 2022). Recent research shows that interventions designed to develop teachers' socio-emotional competencies significantly improve students' social skills, prosocial behaviour, and academic performance, while reducing emotional distress (Durlak et al., 2022). In contemporary teacher education, the development of socio-emotional competencies is increasingly recognised as central to professional effectiveness. Beyond content knowledge and pedagogical techniques, teachers must be able to understand their own emotions, manage stress, communicate effectively, collaborate with others, and engage in critical reflection (Jennings & Greenberg, 2009; OECD, 2021).

Classrooms are fundamentally social and emotional environments, and the quality of teacher–student interactions, instructional decisions, and classroom climate is largely shaped by teachers' socio-emotional competencies. Consequently, preparing future educators to manage emotions, collaborate effectively, engage in reflective judgment, and cope constructively with failure becomes a central task of teacher education programs. Within this context, cross-disciplinary elective courses focused on effective communication and teamwork, critical thinking, and failure management and well-being represent meaningful pedagogical spaces where such competencies can be intentionally

cultivated and connected to the demands of the teaching profession. Effective communication and teamwork are foundational socio-emotional skills that support classroom interaction, conflict resolution, and collaboration with colleagues and parents. Communication competence enables teachers to convey expectations clearly, listen empathetically, and respond to learners' emotional cues, thereby creating an environment conducive to engagement and academic progress. Studies have found that communication skills are strongly linked to teacher effectiveness, particularly in establishing rapport and maintaining a positive classroom climate (Garcia-Rodriguez et al., 2026).

Research (Reyes et al., 2012) indicates that teachers' effectiveness increasingly depends on their ability to collaborate with parents, which requires well-developed communication and teamwork skills. Teachers' abilities to communicate effectively and collaborate with others are key factors in establishing a positive social and emotional classroom climate and in supporting desirable student outcomes. Educators who demonstrate well-developed socio-emotional competencies tend to foster constructive and supportive relationships with their students and to design instructional activities that acknowledge students' individual strengths and capabilities (Jennings & Greenberg, 2009).

Critical thinking, another key socio-emotional dimension, empowers prospective teachers to analyse complex classroom situations, question assumptions, and make reasoned pedagogical decisions. The capacity for reflective judgment and perspective-taking is tied to adaptive instruction and differentiated teaching, allowing educators to respond flexibly to student needs and diverse learning contexts. Research (Brookfield, 2017) suggests that dispositions toward critical thinking support better instructional reasoning and professional decision-making, thereby enhancing overall instructional readiness.

Moreover, resilience and well-being are increasingly acknowledged as vital for sustaining teachers' professional performance. Teaching is emotionally demanding, and the ability to manage setbacks, regulate intense emotions, and maintain psychological well-being has been identified as a strong predictor of long-term job satisfaction and classroom effectiveness. Studies highlight that interventions aimed at strengthening resilience not only improve teachers' well-being but also positively impact their professional interactions and their capacity to support student achievement. To support teachers' well-being, schools must strike a balance between fostering a collaborative institutional culture and respecting teachers' need for individual autonomy, both of which are essential to professional satisfaction (Reyes et al., 2012). Given that, in Romania, this remains largely an aspirational goal, in the absence of clear regulations that directly impact teachers' well-being, it becomes particularly important for teachers to develop the competence to sustain their own well-being and to effectively manage professional setbacks.

Underpinning these discipline-specific constructs is the broader framework of socio-emotional learning, which identifies core competencies such as self-awareness, self-management, social awareness, relationship skills, and responsible decision-making as critical for both personal development and professional functioning. These socio-emotional learning competencies form the foundation of effective teaching practice by enabling educators to create supportive, engaging, and adaptive learning environments. Despite the recognised importance of socio-emotional competencies in education, research on how specific socio-emotional training domains contribute to the development of teaching competencies remains limited. Most existing studies examine general socio-emotional skills or emotional intelligence broadly, without differentiating between the distinct contributions of communication, critical thinking, or resilience-focused training. The present study investigates how three distinct socio-emotional disciplines contribute to the development of teaching competencies in initial teacher education. Rather than approaching socio-emotional learning as a unitary construct, the research examines three complementary pathways: Effective Communication and Teamwork, Critical Thinking Development, and Failure Management and Professional Well-Being. Each discipline targets specific dimensions of socio-emotional growth that are directly relevant to the teaching profession.

The central aim of this investigation is to evaluate the extent to which participation in these cross-disciplinary elective courses is associated with pre-service teachers' self-reported growth across key professional dimensions. To guide the empirical inquiry, the study addresses the following overarching research question: *To what extent and through what perceived mechanisms do the three cross-disciplinary elective courses relate to the development of professional teaching competencies?*

Based on the theoretical framework, the study evaluates the following research hypotheses:

H1: Participation in cross-disciplinary elective courses is significantly and positively associated with students perceived professional teaching development.

H2: Participation in cross-disciplinary elective courses is significantly and positively associated with the perceived enhancement of students' reflective and critical thinking competencies.

H3: Participation in cross-disciplinary elective courses is positively associated with the perceived development of students' cooperation skills.

H4: Participation in cross-disciplinary elective courses is significantly and positively associated with the perceived improvement of students' communication and emotional regulation competencies.

H5: There are significant positive correlations among the perceived dimensions of cross-disciplinary elective courses (reflection, cooperation, and communication), as well as between each of these dimensions and students' overall perceived professional development.

2. Research methodology

The present study is structured as a convergent parallel mixed-methods investigation, designed to examine the multidimensional impact of cross-disciplinary elective courses on the professional profile of pre-service teachers.

2.1. Research Design and Procedure

The research architecture integrates quantitative analysis—focused on identifying relationships and interdependencies among targeted competencies—with qualitative analysis, intended to capture the depth and complexity of students' learning experiences at cognitive, social, and emotional levels. Rather than evaluating a single intervention, the research integrated three pedagogical approaches to socio-emotional development, each represented by one discipline. Data were collected at the end of the semester, after students had completed one of the three cross-disciplinary elective courses. Participation was completely voluntary and anonymous, and formal informed consent was obtained from all respondents prior to data collection. In accordance with this convergent parallel framework, quantitative trends and qualitative experiential insights were collected concurrently at the end of the semester and integrated during the data synthesis phase to provide a more comprehensive interpretation of competence development.

2.2. Participants and Context

The sample comprised 31 female students preparing to work in the educational system, enrolled in initial teacher education programs offered by the West University of Timișoara. Regarding their Bachelor specialties, 20 students were enrolled in the Pedagogy of Primary and Preschool Education, 9 in Special Psychopedagogy, and 2 in Pedagogy.

In terms of academic progression, 12 students were in their second year of study, and 19 were in their third year. The demographic distribution included 17 students from rural areas and 14 from urban environments. Each student participated in only one of the three targeted cross-disciplinary elective courses, distributed as follows: *Effective Communication and Teamwork* (n = 8), *Critical Thinking and Reflexivity* (n = 12), and *Failure Management and Professional Well-Being* (n = 11).

Table 1. Socio-Demographic and Academic Profile of the Sample (N = 31)

Characteristic	Category	Frequency (n)	Percentage (%)
Gender	Female	31	100%
Specialization	Pedagogy of Primary and Preschool Education (PIPP)	20	64.5%
	Special Education	9	29.0%
	Pedagogy	2	6.5%
Environment	Urban	14	45,16%
	Rural	17	54,84%
		8	25,8%
Enrolled Discipline	Effective Communication and Teamwork		
	Critical Thinking and Reflexivity	12	38,7%
	Failure Management and Well-being		
		11	35,5%

2.3. Instruments and Measures

A structured, self-report questionnaire was developed based on foundational literature regarding teacher socio-emotional competencies and reflective practice. The instrument consisted of 30 Likert-type items rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The items were theoretically grouped into four distinct dimensions designed to evaluate the students' perceived competence development:

1. Professional teaching development (8 items).
2. Reflective and critical thinking (10 items).
3. Cooperation skills (4 items).
4. Communication and emotional regulation (8 items).

To capture the experiential depth of the training process, the Likert-scale items were complemented by a set of open-ended qualitative questions. These questions explored students' self-perceptions, the specific pedagogical challenges encountered during the semester, and suggestions for improving the curriculum of the transversal disciplines.

To establish the internal consistency of the instrument, a reliability analysis was conducted using Cronbach's alpha coefficients for each dimension. The scales demonstrated excellent internal reliability: professional teaching development ($\alpha = 0.946$), reflective and critical thinking ($\alpha = 0.947$), cooperation skills ($\alpha = 0.898$), and communication and emotional regulation ($\alpha = 0.928$). All coefficients significantly exceeded the standard threshold of 0.70, validating the psychometric robustness of the measure.

2.4. Data Analysis Strategy

Quantitative data processing was conducted using Microsoft Excel with the Data Analysis Tool Pak add-in. The strength and direction of the linear relationships between the targeted dimensions were evaluated using Pearson correlation coefficients (r).

Furthermore, multiple linear regression analysis was utilized as the primary predictive tool to assess the extent to which the independent transversal dimensions explain the variance in students' perceived professional development. The overall fit, validity, and statistical significance of the regression model were evaluated through the coefficient of determination (R^2) and the ANOVA F-test. Qualitative data from the open-ended items were analyzed using thematic analysis, where responses were systematically coded, categorized into prominent themes, and subsequently integrated with the quantitative findings to contextualize the statistical relationships.

3. Results

3.1. Quantitative Analysis: Correlations and Regression Model

To evaluate the relationships among the perceived competence dimensions and test the operational hypotheses, quantitative analyses were systematically conducted. In alignment with the study's exploratory scope, quantitative data processing focused on examining the linear relationships and predictive value among the targeted dimensions.

First, the evaluation of H5 targeted the linear interdependencies between the dimensions. The statistical output from the correlation matrix (Pearson's r) revealed strong, positive, and statistically significant relationships among the constructs. The complete correlation structure is presented in Table 2:

Table 2. Pearson Correlation Matrix Among the Perceived Competence Dimensions

Perceived Dimensions	Professional development	Reflective capacity	Cooperation skills	Communication skills
Professional development	1			
Reflective capacity	0.92	1		
Cooperation skills	0.51	0.49	1	
Communication skills	0.88	0.93	0.50	1

Note: $N = 31$; all coefficients are statistically significant ($p < .01$).

The correlation analysis details a very high linear association between the capacity for communication and reflective thinking ($r = 0.93$, $p < .01$), as well as between reflective practice and overall professional teaching development ($r = 0.92$, $p < .01$). Additionally, a robust correlation is observed between communication and professional development ($r = 0.88$, $p < .01$). Moderate correlations characterize the links between cooperation and the other targeted dimensions ($r \approx 0.50$), indicating that while teamwork skills are

positively integrated into the training process, they present a distinct developmental variance. Consequently, H5 is fully supported.

To test the collective predictive capacity of the cross-disciplinary elective courses on professional development (H1, H2, H3, and H4), a multiple linear regression analysis was executed. The dimensions of reflective and critical thinking, cooperation skills, and communication and emotional regulation were entered as independent predictors, with professional teaching development serving as the dependent variable.

The regression model demonstrated an exceptionally high overall fit, capturing a substantial proportion of variance, with $R^2 = 0.85$ and an Adjusted $R^2 = 0.84$. This indicates that the selected cross-disciplinary dimensions account for 85% of the variance in students' perceived professional development. The validity of the overall model is strongly supported by the ANOVA F-test ($F(3, 27) = 51.94, p < .001$), with a Significance F value of $p < .001$, ruling out the possibility that these findings occurred by chance. Therefore, H1 is supported. Table 3 summarizes the detailed regression coefficients and significance tests:

Table 3. Multiple Linear Regression Model Results (Dependent Variable: Professional Teaching Development)

Predictors	Coefficients (B)	Standard Error	t Stat	P-value	Tolerance	VIF
Intercept (Constant)	-0.17	0.40	-0.44	0.666	—	—
Reflective and critical thinking	0.81	0.21	3.77	0.001	0.13	7.69
Cooperation skills	0.06	0.08	0.77	0.445	0.75	1.33
Communication and emotional regulation	0.15	0.22	0.68	0.504	0.13	7.69

Note: Model $R^2 = 0.85$; Adjusted $R^2 = 0.84$; Model $F = 51.94$ ($p < .001$).

Multicollinearity diagnostics indicate acceptable thresholds ($VIF < 10.0$), though the high VIF for reflection and communication highlights their strong empirical interdependence ($r = 0.93$). However, in line with the methodological limitations of the sample size ($N = 31$), the exceptionally high correlation coefficients ($r > 0.90$) and the large R^2 value require a cautious, exploratory interpretation. These indicators suggest potential conceptual overlap or shared self-report variance among the subscales, rather than perfectly distinct predictive pathways.

Among the individual predictors, Reflective and critical thinking emerged as the primary statistically significant driver of perceived professional development ($B = 0.81, t = 3.77, p = .001$), fully supporting H2. Conversely, within this unified linear framework, Cooperation skills ($B = 0.06, p = 0.445$) and Communication and emotional regulation ($B = 0.15, p = 0.504$) did not reflect independent statistical significance ($p > .05$). This suggests that their positive contributions (associated with H3 and H4) function

interdependently and are highly mediated by the students' overarching reflective capacities.

3.2. *Qualitative Analysis: Pre-Service Teachers' Experiential Perceptions*

To enrich the quantitative findings and address the underlying developmental mechanisms, the qualitative data obtained from the open-ended questions were systematically analyzed. The thematic analysis revealed that students perceived the cross-disciplinary elective courses not merely as theoretical coursework, but as dynamic, transformative learning environments that directly shaped their emerging professional identity.

The responses were structured around three core themes that illustrate how these disciplines support teacher training:

1. **The role of reflexivity and critical thinking:** students consistently highlighted that the exercises focused on self-reflection allowed them to evaluate their own learning styles and emotional responses. This dimension was perceived as a crucial bridge toward future classroom practice, helping them understand how to adapt their teaching strategies to diverse student needs.

2. **Collaborative learning and communication infrastructure:** participants emphasized that teamwork activities and applied communication exercises helped reduce the feeling of "academic isolation". Learning how to collaborate effectively with peers was perceived as essential competency for their future integration into school faculties.

3. **Psychological safety and failure management:** A major finding from the qualitative strand was the value students placed in creating a "safe space" where errors were treated as learning opportunities. Learning to manage professional stress and reframe pedagogical failure was reported as a key factor in boosting their teaching confidence.

4. Discussions

The empirical results demonstrate a strong convergence between pre-service teachers' self-reported experiences and the statistical outputs, validating the premise that cross-curricular elective courses developing socio-emotional competencies facilitate a comprehensive transformation across cognitive, social, and emotional domains. The primary quantitative benchmark established in this study is the high explanatory power of the predictive model ($R^2 = 0.85$), which confirms that the collective cluster of transversal competencies accounts for 85% of the variance in students perceived professional teaching development. This statistically robust relationship explicitly supports H 1. It aligns with the foundational theoretical frameworks of Jennings and Greenberg (2009), as well as Brackett et al. (2019), which argue that social and emotional competencies are not peripheral traits, but form the core structural infrastructure required for instructional efficacy and professional readiness.

4.1. Development of Reflectivity and Critical Thinking (H2)

A key contribution of the study lies in identifying reflective and critical thinking as the central dimension of competence development. Within the unified multiple linear regression model, this dimension emerged as the primary independent predictor with a strong direct association ($B = 0.81$, $t = 3.77$, $p = .001$), fully supporting H 2. This statistical dominance indicates that the structured cultivation of critical thinking induces a profound cognitive reconfiguration in future educators, moving them beyond the passive accumulation of pedagogical techniques toward an active paradigm of adaptive instruction.

The qualitative narratives strongly substantiate this mechanism. Students described the development of critical thinking not merely as a theoretical acquisition, but as a personal paradigm shift, reporting an increased ability to analyze their own cognitive processes and adjust their reasoning through argumentation. This experiential evolution is heavily documented in recent teacher preparation literature. For instance, Loaiza et al. (2025) and Nair (2025) demonstrate that systematic interventions focusing on reflective reasoning and contextual argumentation dramatically improve instructional decision-making. Furthermore, explicitly addressing unexamined biases prevents them from negatively shaping classroom evaluative judgments, a critical need highlighted by Yuan et al. (2023) and Pedraja-Rejas et al. (2025).

4.2. Collaborative Dimension and Social Interaction (H3)

Although regression analysis indicated a lower independent predictive impact of cooperation ($B = 0.06$, $p = 0.445$) compared to reflective thinking, qualitative data suggests that collaboration represents a highly salient dimension at the experiential level. The statistical output from the correlation matrix documents a solid bivariate association between cooperation and professional development ($r = 0.51$, $p < .01$). This dual dynamic indicates that while cooperation creates a supportive learning context, it functions more as an enabling environment than as an isolated linear pathway.

The qualitative data reinforces this by revealing that collaborative activities significantly reduced academic isolation among participants, shifting their mindset toward shared responsibility and mutual trust rather than centralized control over group processes. This process mirrors the social interdependence theories of Johnson and Johnson (2009), as well as the peer-learning models of Boud et al. (2014), establishing that collaborative architectures promote balanced participation and help pre-service teachers gradually overcome initial communication barriers while building confidence in group settings (Oakley et al., 2004).

4.3. Communication and Emotional Regulation (H4)

In line with the cooperation subscale, communication and emotional regulation ($B = 0.15$, $p = 0.504$) did not display independent significance within the regression analysis. As requested by the peer-review process to examine potential overlaps among dimensions, a rigorous multicollinearity audit was conducted. The diagnostics reported in Table 3

reveal a low Tolerance of 0.13 and a Variance Inflation Factor (VIF) of 7.69 for both communication and reflective thinking. While these parameters reside within acceptable statistical thresholds (< 10.0), they mathematically expose a massive conceptual and empirical overlap between the two domains, supported by their intense mutual correlation ($r = 0.93, p < .01$).

Consequently, H 3 and H 4 are supported through an interdependent rather than isolated framework. Communication techniques and emotional regulation act as the essential infrastructure that activates reflective practice. Experientially, students reported a clear progression in self-confidence, driven by the reframing of failure as a learning opportunity and the presence of a psychologically safe learning environment. As synthesized by CASEL (2020) and Deci and Ryan (2000), teaching is an inherently relational profession. Providing future teachers with intrapersonal self-regulation strategies and stress management tools directly enhances their emotional resilience, allowing them to navigate complex school environments safely.

4.4. Strengths, Limitations, and Future Directions

This study possesses distinct methodological strengths, including a parallel mixed method design across multiple socio-emotional training modules implemented within an authentic higher education ecosystem at the West University of Timișoara.

However, multiple prominent boundaries must be cautiously acknowledged. The sample size is relatively small ($N = 31$) and composed entirely of female participants within a single institution. Given this cross-sectional approach, all statistical claims must be interpreted strictly in associative, exploratory terms rather than causal relationships. The extremely high variance explained ($R^2 = 0.85$) and the high VIF parameters (7.69) reflect a shared self-report variance among subscales rather than completely distinct predictive pathways.

To address these empirical boundaries, future research must implement longitudinal designs tracking these pre-service teachers into their professional induction years. Expanding the scope to larger, multi-institutional, and randomized samples will allow for advanced structural equation modeling to disentangle the mediated pathways between communication, cooperation, and cognitive reflexivity.

5. Conclusions

The integration of quantitative matrices and qualitative feedback in this study confirms the structural validity of the "reflective-collaborative professional" model within initial teacher education. Cross-disciplinary elective courses focusing on socio-emotional skills do not represent peripheral educational components; rather, they serve as foundational instruments that explain 85% of the variance in pre-service teachers perceived professional readiness.

Reflective and critical thinking represents the main cognitive pillar of this developmental process, directly driving students' ability to break down educational contexts, minimize personal biases, and make informed instructional choices.

Simultaneously, communication techniques and cooperation skills provide the necessary interpersonal framework, reducing professional anxiety, eliminating academic isolation, and cultivating emotional regulation strategies that are vital for early career survival.

Based on the explicit feedback and systemic gaps identified by the participants, this study offers three clear recommendations for optimizing the initial teacher training curriculum:

1. **Practical curricular expansion:** Move beyond theoretical lectures by systematically expanding experiential learning tasks, including live case studies, pedagogical role-playing, and rigorous debate-based modules.

2. **Multimedia and technological integration:** Enhance instructional delivery through visual and digital resources, such as video-based conflict analysis tools, to simulate authentic classroom dilemmas.

3. **Organizational and structural synchronization:** Restructure the scheduling and delivery of cross-disciplinary elective courses to minimize physical and mental fatigue, thereby facilitating smoother access for non-traditional or working students.

In conclusion, this study provides strong empirical justification for the systematic, structured inclusion of standalone cross-disciplinary elective courses within teacher preparation frameworks. By intentionally balancing cognitive reflexivity with emotional security and cooperative infrastructure, higher education institutions can effectively prepare future educators capable of navigating the complex, dynamic realities of modern school environments.

Ethical considerations

The study followed ethical guidelines regarding: voluntary participation, anonymity, confidentiality, and use of data exclusively for research purposes. Both authors contributed equally to the conception, design, and writing of this manuscript.

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Exploring Self-Efficacy in Teacher Education: A Systematic Review Focused on Developing Countries

Ei Phyu KYAW*, Angéla BAJZÁTH**, Judit KOVÁCS***

Abstract

A substantial body of research has examined teachers' self-efficacy; however, much of this literature remains largely concentrated in developed-country contexts, leaving developing regions comparatively underexplored. This systematic literature review addresses that gap by focusing on self-efficacy in teacher education across developing countries, where persistent challenges such as limited resources, overcrowded classrooms, and inadequate training opportunities significantly shape educational experiences. Drawing on Bandura's self-efficacy theory, the study employs a systematic literature review to analyse 30 empirical studies of self-efficacy in teacher education across developing countries. Following PRISM

A guidelines, relevant studies were systematically extracted from major academic databases such as the Web of Science (WOS), Scopus, and ProQuest databases, with inclusion criteria that limited the sample to English-language, peer-reviewed journal articles published between 2016 and 2025. The review identified several major patterns in research themes, methodological approaches, and the geographic distribution of the studies. Overall, the findings indicate that Turkey dominates self-efficacy research among the 13 developing countries, highlighting regional imbalances in scholarly attention and research capacity. Across these studies, self-efficacy of pre-service teachers is shaped primarily by experiential and environmental factors including the quality of practicum experiences, mentorship support, and institutional environments rather than demographic characteristics. However, the dominance of cross-sectional quantitative studies restricts understanding of how self-efficacy develops over time and how broader contextual factors influence its evolution. These results strongly underscore the need for more diverse methodological approaches, particularly experimental, qualitative, and longitudinal designs, to provide deeper insights into how teacher self-efficacy develops and operates across varied educational systems and sociocultural settings.

Keywords: self-efficacy; pre-service teachers; teacher education; developing countries

* Doctoral Student, Faculty of Education and Psychology, Eötvös Loránd University, Budapest, Hungary, eiphyu@student.elte.hu

** Assistant Professor, PhD. Faculty of Education and Psychology, Eötvös Loránd University, Budapest, Hungary, bazath.angela@ppk.elte.hu

*** Retired Professor, PhD. Faculty of Primary and Preschool Education, Eötvös Loránd University, Budapest, Hungary, dr.judit.kovacs@t-online.hu



Introduction

Teacher self-efficacy is one of the most important psychological constructs to understand teacher motivation (Ma et al., 2021). “Teacher self-efficacy” has been extensively examined across disciplines and largely in Western contexts (Klassen, 2004), comparatively, pre-service teachers’ self-efficacy in non-Western and different cultural contexts has received less attention including developing countries. Cross-cultural research is essential in self-efficacy studies as it provides an insight into how cultural values, social experiences, and environmental conditions shape individual’s beliefs about their applicability of theories across diverse populations (Marsh et al., 2002).

Teacher self-efficacy is a key construct in educational psychology, grounded in Bandura’s social cognitive theory. It refers to teachers’ beliefs in their capability to organize and execute actions required to successfully carry out professional tasks (Bandura, 1977; Morris et al., 2017). A substantial body of research has established that higher teacher self-efficacy is associated with effective instructional practices, emotional regulation, professional commitment, and student-related outcomes (e.g., Goddard et al., 2004; Tschannen-Moran & Barr, 2004).

Self-efficacy is not a fixed attribute, but a dynamic belief system that is particularly malleable during the initial phase of teacher education, when individuals are developing professional identities and gaining practical classroom experiences (Klassen & Durksen, 2014; Chesnut & Burley, 2015). According to Bandura (1997), once self-efficacy beliefs are established, they become relatively resistant to change. Pre-service teacher education represents a critical stage in the development of teacher self-efficacy and has therefore received considerable attention in educational research (Gravis, Twigg & Pendergast, 2011; Gravis & Pendergast, 2022; Jeanneret, 1997; Kane, 2008). Investigating the self-efficacy beliefs of pre-service teachers is essential because these beliefs constitute the initial efficacy levels that future beginning teachers bring into the teaching profession, influencing their subsequent professional practice and development.

The foundation of this review study relies on the context of the developing countries. In these contexts, structural conditions such as limited resources, large class sizes, and constrained opportunities for professional support may shape pre-service teachers’ self-efficacy beliefs in ways that differ from high-income or developed settings. Furthermore, Wang et al. (2024) highlighted developing countries can play a significant and leading role in advancing teacher education research.

By 2016, some review studies related to teacher self-efficacy had been identified, for example, inclusive classroom teaching (Sharma & George, 2016); effect on classroom processes, student academic adjustment, and teacher well-being (Zee, 2016); professional development and efficacy change (Yoo, 2016). Again, Berg and Smith (2016), in their study of pre-service teachers’ self-efficacy beliefs, described self-efficacy as an opportunity to generate good research and suggested further research in the Asia-Pacific regions.

Understanding these contextual influences is therefore essential for developing teacher education programs that effectively foster preparedness and sustained professional commitment. Furthermore, dominant reliance on quantitative methods in prior research may overlook culturally and contextually specific factors that influence self-efficacy in these environments. Examining self-efficacy in developing countries is particularly important because cultural norms, institutional practices, and resource constraints may interact in unique ways to influence pre-service teachers' confidence and classroom readiness.

This review aims to address these gaps by examining pre-service teachers' self-efficacy research in the context of developing countries, focusing on study characteristics, methodological approaches, and key thematic trends to provide a comprehensive overview of how self-efficacy has been investigated in these contexts. By analysing these patterns, the review provides a foundation for understanding how self-efficacy has been investigated and for guiding future teacher education research in diverse contexts.

2. Research Question

To better understand the scope and direction of self-efficacy research in teacher education, this study is guided by the following questions.

- (1) What are the characteristics of the self-efficacy studies included in this review?
- (2) What are the key themes of pre-service teachers' self-efficacy research in developing countries?

3. Research design

This study adopted a systematic review method to identify, select and analyse relevant studies systematically. Systematic reviews follow a predetermined protocol and selection process to be transparent, thorough, and reproducible. (Lame, 2019), and are beneficial for identifying gaps and future research directions (Petticrew & Roberts, 2006). There have been a considerable number of review studies related to teachers' self-efficacy; however, there are few studies of teacher self-efficacy focusing on the contexts of developing countries. Researchers aimed to fill this gap with this systematic review.

This review was conducted using the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which provides a standardized method for reporting the review process. This is a guideline for locating, screening, and evaluating relevant studies. The aim was to ensure clarity in reporting, transparency in study selection, and consistency in synthesizing findings across studies related to teacher self-efficacy, particularly in developing country contexts.

Procedure

The whole process of systematic literature review began in June 2025. After determining the topic and formulating the research questions, keywords for the search have been identified. A search strategy with a combination of key terms, "self-efficacy" AND "teacher education," was adopted to locate relevant studies with related inclusion and exclusion

criteria applied in the initial phase. The keyword search was conducted in three electronic indexing databases: Web of Science WOS, Scopus, and ProQuest. The search was limited to studies published between 2016 and 2025, aligning with capturing recent and relevant developments in the field. This time frame also reflects what Berg and Smith (2016) encouraged further research on teacher self-efficacy in the Asia-Pacific regions, allowing the review to examine how the literature has evolved in response to this identified research need.

Additional filters were applied to identify self-efficacy articles written in English-language journals that used empirical research and published in the 'Education & Educational Research' area, which is classified under the Social Sciences category, available as open-access publications. Records identified through the keyword search were imported into the reference management software Zotero to support the screening process.

Screening

The first author conducted the screening process with the aim to identify studies that specifically examined self-efficacy in teacher education within developing countries. To improve the screening process, a set of inclusion and exclusion criteria was created from the original pool of several hundred articles. These criteria focused on whether the study looked at self-efficacy empirically, whether it was applicable to teacher education, and whether it focused on pre-service or in-service teachers. The screening process ensured that the final selection accurately reflected the state of research on self-efficacy in teacher education in developing countries.

Inclusion and Exclusion Criteria

Articles were chosen using inclusion criteria to ensure relevance and quality. Based on the aim, the term "self-efficacy" or "teacher self-efficacy" was included in the context of teacher education. Studies that (i) employed in teacher education (ii) conducted only empirical research (quantitative, qualitative or mixed methods) (iii) focused on pre-service teachers as participants and (iv) implemented only in developing countries.

According to Table 1, articles were excluded from consideration if they were outside the scope of teacher education, for example, studies from unrelated fields such as engineering, medicine, or natural sciences. In addition, publications with titles or abstracts that did not reflect a clear focus on self-efficacy or teacher education were also removed, and studies that were conducted in the contexts of developed countries, in other words, high-income countries, according to World Bank Data.

Table 1 Inclusion and Exclusion Criteria

No.	Inclusion Criteria	Exclusion Criteria
1	Studies employed empirical research.	
2	Studies are conducted in teacher education.	
3	Participants are pre-service teachers.	All studies not matching the inclusion criteria are excluded.
4	Studies are implemented only in developing countries.	

In this study, “developing countries” are defined as those with a Gross National Income (GNI) per capita below 13,935 U.S. dollars, according to the World Bank’s income classification criteria as seen in Figure 1.

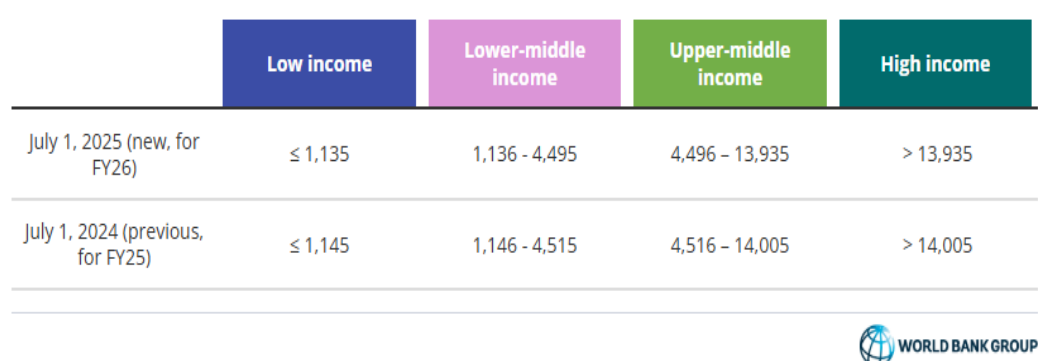


Figure 1 World bank's group of income classification

The World Bank Group classifies the world economies into four income groups_ low, lower-middle, upper-middle, and high and updates classifications annually on July 1 based on the previous year's GNI per capita, expressed in U.S. dollars using the Atlas method. This study uses World Bank data updated on July 1, 2025.

Selection Process

The study selection process followed the PRISMA framework. A total of 1,265 articles were initially identified through three database searches, Web of Science (n = 385), Scopus (n = 590), and ProQuest (n = 290). All identified records were imported to the Zotero software, where duplicates (n = 182) were identified and eliminated during the initial screening phase and 1,083 records remained for the screening stage.

The screening process was conducted in accordance with predefined inclusion and exclusion criteria. Only studies explicitly conducted within developing countries, as defined by the World Bank income classification at the time of publication, were included. This classification ensured that the review remained consistent with its aim to explore teacher self-efficacy research within the social, economic, and educational conditions typical of developing countries. Screening with the criteria "in the context of developing countries" removed 861 studies (n = 861) that were not conducted in developing

countries. The criteria "only pre-service teachers in teacher training or teacher education" dismissed 94 studies that employed participants from in-service teachers and students ($n = 94$), and 128 studies remained for further screening for eligibility ($n = 128$). Among them, 82 studies conducted in the "developing countries" context are eligible for this study. At the eligibility stage, a further 52 studies ($n = 52$) were excluded because of being not clearly focused on pre-service teachers' teaching-related self-efficacy. Finally, only 30 studies ($n = 30$) focusing on pre-service teachers' teaching self-efficacy met all the criteria and were included in this review.

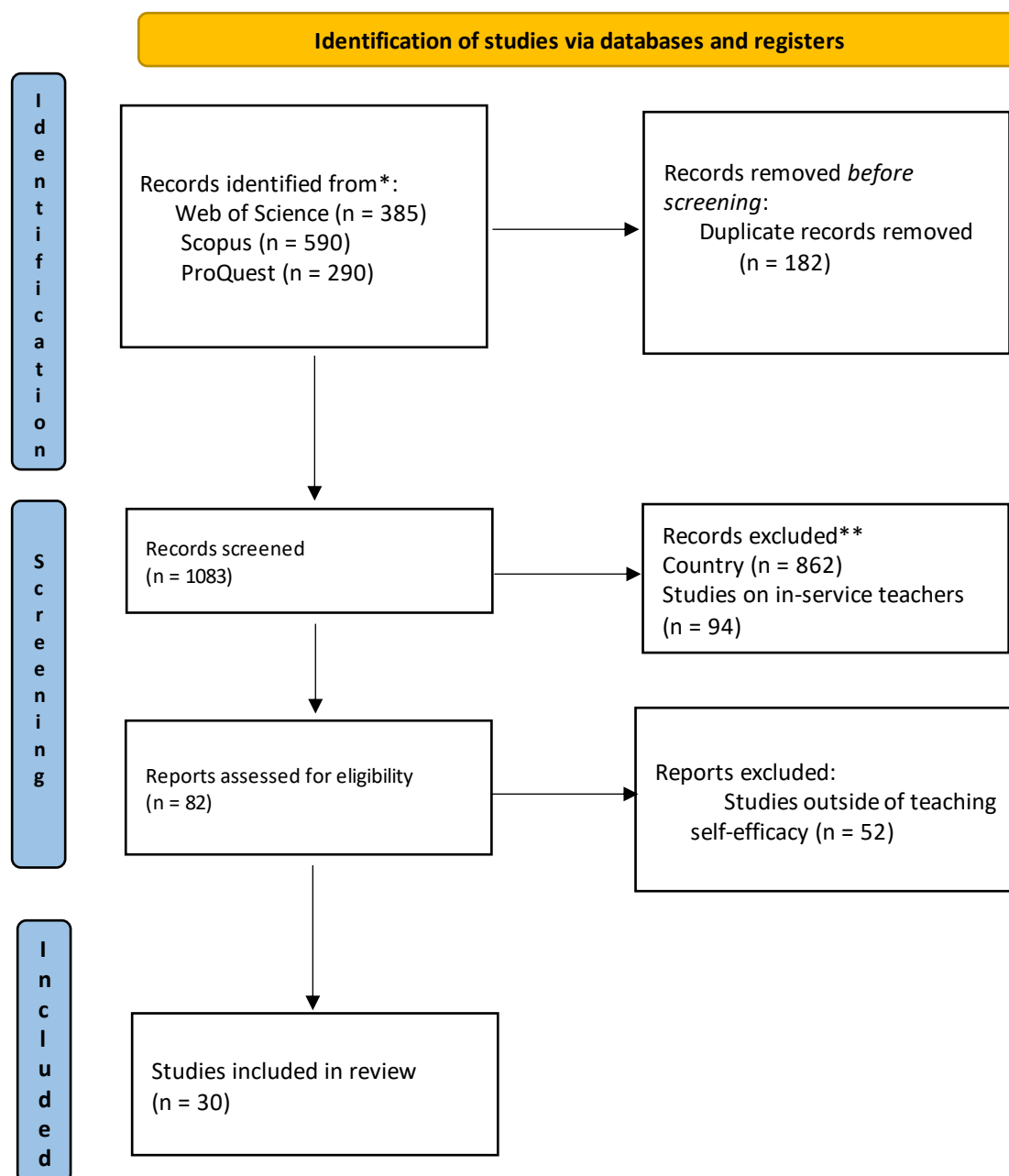


Figure 2 PRISMA flowchart diagram

In this step for synthesis, all 30 studies were read in full text, and the data extraction matrix was created in a Microsoft Excel spreadsheet, including the following elements:

author/year, country, participants, research design, type of self-efficacy scale, research focus, and research findings/conclusion. The data analysis was conducted across these categories to understand the patterns of how teacher self-efficacy has been explored and described in the context of developing countries.

4. Findings

The findings are organized according to two research questions, drawing on the demographic data from the empirical studies, including the information on research location and design, and incorporating the key determinations from Bandura's (1986b) social cognitive theory, which are categorized to provide a comprehensive analysis.

RQ 1: What are the characteristics of self-efficacy studies included in this review?

Our analysis of 30 studies covering the period 2016-2025 is organized by the location where the research is implemented, the research instrument, and the participants from the empirical studies included in this review.

Research Location

This study focused solely on self-efficacy research conducted in developing countries, lower and middle-income economies, according to world bank classification. When the search results were analysed by the 'Countries/Regions' category, this revealed that the studies (n=30) included were conducted across 13 countries.

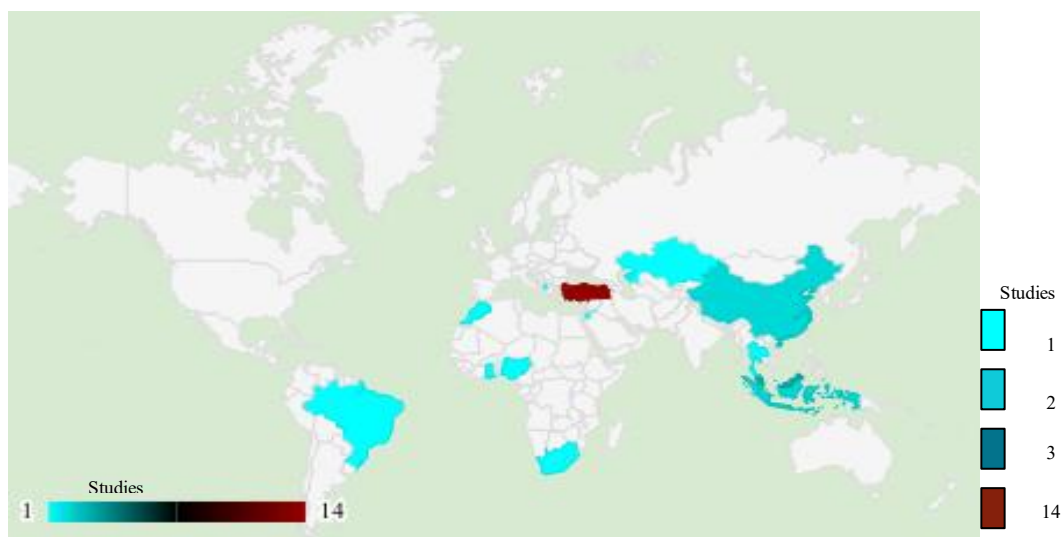


Figure 3. Studies by geographical location

Figure 3 shows the countries that have conducted the most research on pre-service teachers' self-efficacy. The findings presented that many studies have been implemented mostly in Turkey than other countries. Turkey accounted for nearly half of all studies (n = 14), followed by Malaysia with 3 studies (n = 3), Indonesia and China have 2 studies each (n=4), meanwhile a number of countries reported only one study each, representing

the least publication output, including Brazil, Ghana, Nigeria, South Africa, Jordan, Morocco, Albania, Kazakhstan, and Thailand (n = 9).

Table 2: Studies by region, country, and income.

Study	No	Region	Country	Country by income
Kuhn et al., 2020	1	South America	Brazil	Upper middle-income
Hendricks et al., 2024	1	Sub-Saharan Africa	South Africa	
Kwarteng & Servoh (2024)	1		Ghana	Lower middle-income
Ene et al. (2020)	1		Nigeria	
Altarawneh, et al. (2023)	1	Middle East & North Africa	Jordan	
El Ouahabi et al., 2025	1		Morocco	
Sogutlu, 2022	1	Europe & Central Asia	Albania	Upper middle-income
Baltaoglu & Güven (2019), Dikici & Yavuzer (2025), Elkatmis (2018), Cansiz & Cansiz (2019), Kaleli (2020), Atalay (2019), Saracoglu (2022), Tünkler et al. (2026), Altay (2023), Ozben & Kilicoglu (2021), Yildirim et al. (2025), Arslan (2019), Bars & Oral (2017), Muşlu Kaygisiz et al. (2020)	14		Turkey (14)	
Shuakbayeva et al., 2025	1		Kazakhstan	
Chan & Lay (2021), Ismail et al. (2024), Ngui & Lay (2020)	3	Asia-Pacific	Malaysia (3)	
Mustadi et al. (2023), Saputro et al. (2020)	2		Indonesia (2)	
Sonsupap et al., 2025	1		Thailand (1)	
Ma & Cavanagh, 2018, Zheng et al., 2024	2		China (2)	
Total	30 studies		13 countries	

The table 2 summarizes 30 studies conducted across 13 countries, revealing a clear imbalance in regional and economic representation. Most studies are concentrated in Europe and Central Asia, largely due to Turkey's dominant contribution of 14 studies, nearly half of the total while other regions such as Sub-Saharan Africa, the Middle East

and North Africa, and South America are represented by only one or a few studies per country. The Asia-Pacific region shows moderate participation, particularly from Malaysia, Indonesia, and China.

In terms of economic classification, the majority of studies originate from upper middle-income countries (n=16), with relatively few from lower middle-income countries (n=4) and none from low-income contexts. Turkey's disproportionately high contribution may be explained by factors such as a strong national research focus the teachers' self-efficacy, a well-developed higher education and academic publishing system, and greater access to research funding and institutional support compared to many other countries in the dataset. Overall, this uneven distribution suggests that research activity is influenced by regional and economic factors and highlights a lack of global representativeness, indicating the need for more geographically and economically diverse studies in future research.

Table 3: Distribution by study area

COUNTRY	AUTHORS/ YEAR	AREA
TURKEY	Tünkler et al. (2016)	Instructional Technologies and Material Development ITMD course
TURKEY	Bars & Oral (2017)	Teacher Education (TE)
CHINA	Ma & Cavanagh, 2018,	TE
TURKEY	Atalay (2019)	English as a Foreign Language
TURKEY	Arslan (2019)	TE
TURKEY	Cansiz & Cansiz (2019)	TE
TURKEY	Baltaoglu & Güven (2019)	TE
TURKEY	Cansiz & Cansiz (2019)	TE
TURKEY	Kaleli (2020)	Music teaching
TURKEY	Muşlu Kaygisiz et al. (2020)	Science Teaching,
MALAYSIA	Ngui & Lay (2020)	TE
INDONESIA	Saputro et al. (2020)	TE
BRAZIL	Kuhn et al., 2020	Physical Education
NIGERIA	Ene et al. (2020)	TE
TURKEY	Ozben & Kilicoglu (2021)	Mathematics Teaching
MALAYSIA	Chan & Lay (2021),	Science Teaching

TURKEY	Saracoglu (2022)	Mathematics Teaching
ALBANIA	Sogutlu, 2022	English as a Foreign Language program
TURKEY	Altay (2023)	English as a Foreign Language Education
JORDAN	Altarawneh, et al. (2023)	TE
INDONESIA	Mustadi et al. (2023),	TE
MALAYSIA	Ismail et al. (2024)	Islamic Education
CHINA	Zheng et al., 2024	Language Teaching
SOUTH AFRICA	Hendricks et al., 2024	Mathematics Teaching
GHANA	Kwarteng & Servoh (2024)	accounting teacher education
TURKEY	Yildirim et al. (2025)	English as a Foreign Language
TURKEY	Dikici & Yavuzer (2025)	TE
KAZAKHSTAN	Shuakbayeva et al., 2025	Inclusive Teaching
THAILAND	Sonsupap et al., 2025	TE
MOROCCO	El Ouahabi et al., 2025	Gender -sensitive teaching practice

All studies in this review focused mainly on teacher education. Among them, English as a foreign language (EFL) teacher education is the most frequently studied discipline, particularly in Turkey, Albania, and China. Mathematics and science teacher education are well-presented. Inclusive education, gender-sensitive pedagogy, Islamic education, physical education, and instructional technology are emerging trends in the studies,

Turkey dominates earlier studies between (2016-2019), and between 2020 and 2023. Self-efficacy studies diverse geographically to Brazil, Malaysia, Indonesia, Jordan and South Africa. Recent studies from 2024 and 2025 indicate a growing interest in specialized areas such as inclusive, gender-sensitive teaching, language teaching, from general teacher education.

Overall, the table indicates that self-efficacy studies has expanded over multiple countries and educational disciplines over the years. However, Turkey remains dominant in the contribution. Although general teacher education is mainly the research focus, recent studies showed the growing number of studies in subject-specific areas such as Language, mathematics, science, inclusive teaching. Nevertheless, research on pre-service teachers' self-efficacy in developing countries remains limited in both volume and disciplinary coverage. The existing studies are geographically dispersed and unevenly

distributed across educational fields, highlighting the need for more empirical evidence from a wider range of developing country contexts.

Participants

Participants in this study were pre-service teachers from diverse disciplines, specializations, and program levels; all are in preparation for various teaching contexts. Most studies focused on pre-service teachers recruited from single institutions, particularly those specialized in subject areas such as science education, language education, physical education, and diversity of education level-programs such as primary, secondary, and early childhood education. In some studies, pre-service teachers were in their final year of undergraduate degrees. Two studies examined the comparison of self-efficacy between pre-service teachers and in-service teachers. (Elkatmis, 2018; Sogutlu, 2022).

Regarding the instruments employed in the self-efficacy studies included in this review, findings revealed that the Teacher Sense of Self-efficacy Scale developed by Tschannen–Moran and Woolfolk–Hoy (2001), also called the Ohio State Teacher Efficacy Scale, is the most frequently used scale (15 out of 30 studies). The scale measured the self-efficacy of pre-service teachers across three dimensions: instructional strategies, classroom management, and student engagement. A single study in this review employed the Scale for Teacher Self-Efficacy (STSE), developed with three sub-scales in teaching: instructional strategies, classroom management, and student engagement. Of the studies reviewed, the remaining 14 studies applied a range of teacher self-efficacy scales through adaptation to the specific context of their studies.

Research Methodologies

This section provides an overview of the research methodologies of the empirical studies examined in this review.

Figure 4 showed that among 30 studies of this review, 22 studies predominantly used quantitative approaches ($n = 22$, 73.3 %), and seven studies adopted mixed methods ($n=7$, 23.3%), and seven studies applied mixed methods ($n=7$, 23.3%). A single study (Ma and Cavanagh, 2018), which employed both quantitative and qualitative methods through surveys with open-ended questions, was not labelled as mixed methods. Most of the reviewed studies were conducted by survey research design with cross-sectional surveys (e.g, Kwarteng & Servoh, 2024), and comparative relational research (Kaleli, 2020; Sogutlu, 2022). A descriptive census survey was implemented by (Zhang et al., 2022), and quasi-experimental research was employed in the study of (Saputro et al., 2020).

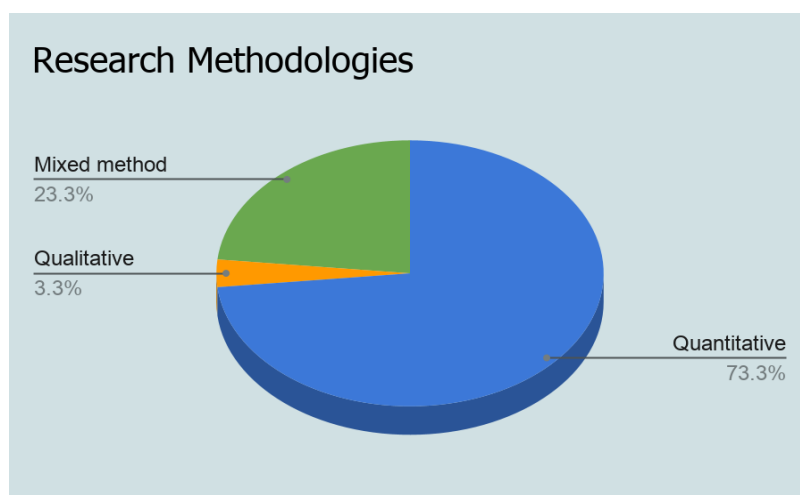


Figure 4. Research methodologies employed in the studies

In the period preceding 2020, eight studies focused exclusively on pre-service teachers' self-efficacy using quantitative methods (Arslan, 2019; Atalay, 2019; Baltaoglu & Güven, 2019; Bars & Oral, 2017; Cansiz & Cansiz, 2019; Elkatmis, 2018; Ma & Cavanagh, 2018; Tünkler et al., 2016). During this period, research primarily relied on survey-based numerical data without qualitative integration. From 2020 onwards, mixed-method designs gain prominence as seen in the studies of (Ozben & Kilicoglu, 2021; Altarawneh et al., 2023; Ismail et al., 2024; Shuakbayeva et al., 2025).

2. What are the key themes of pre-service teachers' self-efficacy research in developing countries?

In this session, the second research question is addressed through the analysis of the 30 self-efficacy studies included in this review under the key theme of the self-efficacy research. These themes are explained by the factors influencing self-efficacy.

In organizing the factors affecting self-efficacy of pre-service teachers, the authors applied Bandura's triadic reciprocal model. This model explains that human behaviour is influenced by three continuous and dynamically interactive components: (1) personal factors (Cognitive, affective, motivational, and demographic attributes), (2) behavioural factors (observable teaching-related actions and intentions), and (3) environmental factors (social and institutional context that impact behaviour) (Bandura, 1991).

As shown in Table 3, individual characteristics such as age, gender, teaching experience, and family background are frequently examined in studies of pre-service teacher self-efficacy. However, findings showed that the influence of these variables is inconsistent across contexts. For example, no significant differences of pre-service teachers' self-efficacy were found regarding high school type or parents' educational level.

On the other hand, psychological and experiential variables appear to have a more consistent and meaningful relationship with self-efficacy. Factors such as motivation, resilience, emotional intelligence, and attitudes toward teaching are frequently

associated with stronger efficacy beliefs. Similarly, skill-based competencies such as reflective thinking, problem-solving, and instructional strategies are often linked to higher perceived teaching competence.

Table 3: Personal, Environmental, and Behavioural Factors Influencing Teacher Self-Efficacy

Personal factors		Behavioural factors	Environmental factors
Cognitive/Affective/ Motivational variables	Individual characteristics	Behavioral intentions in teaching science, Problem-based learning (as a <i>teaching practice</i>), Mathematics instruction (actual teaching behaviour), Teaching strategy, Teaching methods/techniques, Determining taxonomy (if referring to the <i>teacher's assessment/classification behaviour</i>)	Program dimensions (features of the program), Social support, Class time (evening or daytime class) ***** Year of training, Program (e.g.; specialization) University Teaching profession
Motivation, Perceptions, Emotional intelligence, Resilience, Multicultural teaching competence, Teaching career preference, Learning styles, Learning strategies, Constructivist and Traditional Beliefs	Gender, Age, Teaching experience, Ethnicity, Marital Status, Educational level		

However, research on practicum experience presents mixed-results. While some studies report that hands-on practicum experiences significantly enhance pre-service teachers' self-efficacy (Altarawneh et al., 2023), others find no direct correlation between teaching experience and perceived efficacy (Sogutlu, 2022). Finally, validation studies conducted in different cultural contexts highlight the importance of examining self-efficacy within specific educational and cultural environments.

Most studies on pre-service teacher self-efficacy in developing countries were conducted in Turkey, with smaller contributions from Malaysia, Indonesia, China, and other nations. Research predominantly used quantitative methods, with mixed-method designs increasing since 2020, and the Teacher Sense of Self-Efficacy Scale was the most commonly employed instrument. Psychological and experiential factors (e.g., motivation, resilience, instructional skills) were more consistently associated with self-efficacy than demographic variables, while practicum experiences showed mixed results across contexts.

5. Discussion

Most studies were conducted in Turkey (n = 14), with fewer contributions from Malaysia, Indonesia, China, and other countries. This concentration likely reflects country-specific factors such as academic promotion policies, institutional incentives, and indexed

publication pressures (Önder & Kasapoğlu-Önder, 2011), suggesting that findings may predominantly reflect context-specific educational and institutional characteristics rather than generalizable trends. Furthermore, while the World Bank income classification provides a useful framework for identifying developing countries, it may obscure substantial political, cultural, institutional, and educational differences that shape self-efficacy. Countries grouped under the same income level can offer vastly different teacher training experiences, mentorship opportunities, and institutional support, highlighting the need for broader, cross-national investigations to capture diverse pre-service teacher experiences.

Quantitative approaches dominated the reviewed studies ($n = 22$), with cross-sectional surveys being most common. Mixed-method designs are increasingly adopted ($n = 7$) since 2020, yet longitudinal and qualitative research remains limited. This trend reflects a shift toward integrating numerical measures with qualitative depth for richer insight into self-efficacy, indicating the need to better contextualize findings in teacher education research. The methodological pattern limits understanding of how self-efficacy develops over time and of what factors make changes in self-efficacy. The dominance of standardized instruments, such as the Teacher Sense of Self-Efficacy Scale (Tschannen-Moran & Woolfolk-Hoy, 2001), facilitates measurement comparability but may bias attention toward measurable personal and instructional factors while underrepresenting broader environmental influences, including institutional culture, policy contexts, and cultural norms.

Findings indicate that demographic characteristics, such as age, gender, teaching experience, and family background, generally play a secondary role in shaping pre-service teachers' self-efficacy. In contrast, self-efficacy is more strongly influenced by dynamic and developable capacities including motivation, resilience, emotional intelligence, attitudes toward teaching, reflective thinking, problem-solving, and instructional skills. Practicum experiences emerged as a critical but contextually sensitive factor. Positive effects were often linked to high-quality supervision, constructive feedback, and opportunities for mastery experiences, whereas large class sizes, limited resources, and restricted mentor support in some developing-country contexts negatively affected self-efficacy development. These findings highlight that self-efficacy develops from the interaction of personal capabilities, behavioural engagement and environmental supports, aligning with Bandura's (1997) concept of reciprocal determinism. Notably, most of the studies overemphasize personal and behavioural factors, while environmental influences such as institutional support, mentorship quality and cultural contexts remain underexplored.

Institutional support including professional development, mentorship, and leadership guidance, was consistently associated with stronger self-efficacy. However, its availability and effectiveness vary widely across developing-country contexts, further illustrating the interplay between environmental conditions and individual beliefs. This highlights the concept that "pre-service teachers' self-efficacy is highly context-

dependent” and mastery experiences are the most effective when embedded within supportive institutional structures and systematic feedback mechanisms.

Based on these findings, several conceptual contributions emerge. First, self-efficacy development is less influenced by personal or individual factors and more developed by experiential and environmental factors, emphasizing the importance of program design and practicum quality. Second, methodological choices shape knowledge production, as cross-sectional surveys dominate the field, potentially underrepresenting longitudinal dynamics, and the influence of systematic factors. Third, contextual factors ranging from institutional resources to cultural norms mediate how interventions are enacted and shape the extent to which mastery experiences foster the development of teacher self-efficacy.

These findings suggest directions for future research. Longitudinal and qualitative studies are needed to unpack the causal mechanisms underlying self-efficacy development. Expanding research to underrepresented developing countries would enhance global representativeness, and continued validation of measurement instruments ensures cross-cultural reliability and applicability. Moreover, future studies should examine a broader range of teacher education experiences such as coursework, peer teaching, mentor feedback, and classroom practices and explore systemic factors such as policy, family support, and institutional culture. Integrating these dimensions will provide a more detailed understanding of how personal, behavioural, and environmental factors interact to shape pre-service teachers’ self-efficacy, offering stronger alignment with Bandura’s social cognitive theory and advancing the conceptual foundation of teacher self-efficacy research in developing-country contexts.

Despite these findings, it is important to acknowledge that our study has several limitations. As the scope of this review was limited to only open-access articles from the WoS, Scopus and ProQuest databases, relevant empirical studies not indexed in these databases may have been excluded. Including additional studies may influence the overall findings, as this review could not examine the methods and findings in each included study in detail. Therefore, we recommend more review studies of pre-service teachers’ self-efficacy indexed in other databases like ScienceDirect, and EBSCO (host) databases to provide a more comprehensive overview of pre-service teachers’ self-efficacy research in developing countries.

6. Conclusion

In conclusion, this review synthesized research on pre-service teachers’ self-efficacy in developing countries between 2016 and 2025. The findings reveal a strong influence of self-efficacy research from Turkey, predominance of quantitative cross-sectional designs, and limited attention to longitudinal development within comprehensive teacher education programs. Across the review, pre-service teachers’ self-efficacy in developing countries is less influenced by demographic factors, and more strongly by psychological, experiential and contextual factors. Effective practicum experiences and institutional

support are crucial, and interventions to enhance self-efficacy must be tailored to local conditions rather than relying on universal models. Overall, the evidence presented in this review highlights the need for more context-sensitive and methodologically diverse research to advance understanding in this field. In addition, compared with Western and high-income and developed countries, there is a notably smaller number of studies on teachers' self-efficacy conducted in low- and middle-income countries. Therefore, future studies in developing countries should be encouraged to generate a broader range of contextual evidence and enhance the global understanding of teacher self-efficacy. Providing support to researchers in these countries and promoting greater international cooperation are important for strengthening research capacity, facilitating knowledge exchange, and increasing their contributions to global research.

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A Systematic Review of the Educational Implications of Artificial Intelligence: Benefits and Challenges Post -Covid-19 Pandemic

Fatma MAAMRI*

Abstract

The rapid integration of Artificial Intelligence (AI) into academic environments has accelerated significantly in the post-COVID-19 era. This study presents a systematic literature review (SLR) evaluating the reported pedagogical benefits and structural challenges of AI applications in education. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework guidelines, a comprehensive search was executed across major academic databases, targeting peer-reviewed empirical literature published between 2021 and 2026. Applying strict inclusion and exclusion criteria, a final analytical sample of twenty ($N = 20$) international studies was synthesized. The thematic analysis demonstrates that while AI tools offer significant educational benefits—such as learning personalization, enhanced language acquisition, and the automation of administrative workloads—they present critical pedagogical and ethical challenges. These risks focus heavily on cognitive disengagement, diminished student critical thinking, and algorithmic data privacy vulnerabilities. This review highlights that the successful deployment of AI relies on balancing technological integration with robust ethical frameworks while preserving the central instructional responsibility of human educators.

Keywords: Artificial Intelligence; Education; Systematic Review; Benefits; Challenges.

* Dr. Fatma Maamri, graduated from the National Higher School of Statistics and Applied Economics, and contract Lecturer in the National Higher School of Marine Sciences and Coastal Management, Algeria. Contact: +213 557081308, or: fatma.maamri4@gmail.com , fatma.maamri@enssmal.edu.dz



1. Introduction

The integration of Artificial Intelligence (AI) into academic institutions represents one of the most transformative shifts in contemporary education. Driven by rapid advancements in machine learning, natural language processing, and adaptive digital architectures, AI technologies have transitioned from theoretical computational concepts into active pedagogical infrastructures. The COVID-19 pandemic served as a major catalyst for this socio-technical acceleration, forcing global educational systems to adopt emergency remote learning and opening the path for widespread institutional deployment of automated grading systems, intelligent tutoring systems (ITS), and generative dialogue agents. Consequently, evaluating the educational implications and reported impacts of these applications has become a critical priority for educational researchers and institutional leaders. Despite the expanding body of literature surrounding educational technology, current academic debates often suffer from a dual limitation. First, existing research frequently adopts an overly binary framing, isolating positive technological advantages from operational and ethical risks without providing a unified perspective. Second, while isolated software evaluations exist, there remains a distinct research gap concerning the comprehensive synthesis of how academics and educators perceive these tools following the rapid digital shift post-2020. This study addresses this research gap by conducting a rigorous systematic literature review to map out the multi-layered benefits and challenges associated with AI adoption in modern schools and universities. To address this objective, this paper investigates the hypothesis that while AI applications offer substantial operational efficiencies—such as optimizing administrative tasks and allowing continuous, self-paced learning—their over-reliance significantly introduces cognitive dependency and institutional risks. Given the exponential growth of recent research, a systematic literature review (SLR) approach is uniquely suited for this study, as it provides a transparent, structured, and reproducible methodology to synthesize rapidly evolving empirical data. The remainder of this paper is organized as follows: Section 2 provides a thematic conceptual synthesis of the existing literature; Section 3 details the systematic screening and selection methodology; Section 4 presents the synthesized results and an interpretive discussion; and Section 5 concludes with institutional recommendations and prospective paths for future research.

2. Literature Review

2.1. Conceptual Evolution and Definitions of Educational AI

The relationship between computational systems and pedagogical environments dates back to the mid-twentieth century. As (Doroudi, 2023) notes, the historical development of cognitive sciences and artificial intelligence has been deeply intertwined with education, largely because early AI pioneers were knowledge creators who sought to understand and replicate learning pathways. Formally introduced by John McCarthy in 1955 as "the science and engineering of making intelligent machines," the core objective of AI was to program systems to mimic human problem-solving capabilities (Manning,

2023). In contemporary institutional settings, this translates into advanced algorithms that analyze massive amounts of data from diverse digital sources—such as system logs, human-generated content, and monitoring tools—to optimize institutional dynamics. Rather than serving as a static technical tool, modern AI functions as an adaptive infrastructure driven by machine learning, automated evaluation frameworks, and natural language processing.

2.2. Pedagogical and Operational Benefits of AI Integration

Empirical literature highlights significant operational efficiencies and learning enhancements driven by AI deployment across global educational landscapes. According to data synthesized by the World Economic Forum (Willige, 2024), AI-driven tools are successfully addressing structural educational divides through international case studies: promoting educational inclusion via adaptive textbooks in South Africa, scaling personalized curriculum mapping in the United Arab Emirates, and accelerating large-scale literacy initiatives in Brazil. In higher education, foundational research demonstrates that these computational platforms fundamentally transform classroom dynamics by automating heavy administrative tasks and grading frameworks, which allows faculty members to allocate more time to student mentorship (Mohamed Ali Khudri, 2022). By introducing intelligent tutoring systems (ITS) and virtual learning environments, AI enables large student populations to access flexible, continuous education at a fraction of traditional operational costs, thereby shifting pedagogical focus toward self-paced and individualized learning models.

2.3. AI Applications in Language Learning and Cross-Cultural Settings

A substantial portion of post-pandemic educational literature focuses on the role of AI within Second Language Acquisition (SLA) and English as a Foreign Language (EFL) context. Foundational studies in language learning support the premise that automated error correction provides non-judgmental environments that significantly reduce student anxiety and promote active linguistic experimentation (Dodigovic, 2009). Recent syntheses identify six major operational forms of language learning AI architectures: Automatic Evaluation Systems, Neural Machine Translation Tools, Intelligent Tutoring Systems, AI Chatbots, Intelligent Virtual Environments, and Affective Computing (Jiang, How does artificial intelligence empower EFL teaching and learning nowadays? A review on artificial intelligence in the EFL context, 2022). In developing regions, particularly across the African continent, these deployments are expanding rapidly, offering unique mechanisms for handling linguistic diversity, provided they are balanced by localized policy solutions that ensure socio-economic inclusion (Gwagwa, 2020).

2.4. Institutional Challenges, Ethical Dilemmas, and Post-Pandemic Perceptions

Conversely, the expanding reliance on digital algorithms introduces severe socio-

technical risks and ethical tensions. Initial literature reviews conducted during the onset of the COVID-19 pandemic indicated that while students in regions like Saudi Arabia maintained favorable perceptions of early e-learning tools, the systemic operational drawbacks remained largely underexplored due to the emergency nature of the digital transition (Layali & And Al-Shlowiy, 2020). As AI tools have evolved into more autonomous entities, critical research has begun pointing out deep structural risks. These focus on data privacy vulnerabilities, the lack of transparency in proprietary "black box" algorithms, and systemic inequities regarding technology access. More importantly, emerging empirical data links over-reliance on generative dialogic systems to cognitive issues, including student learning procrastination, memory retention loss, reduced critical thinking, and socio-emotional isolation in virtual classrooms.

2.5. Synthesis and Identification of the Research Gap

A critical review of the existing literature reveals that while early foundational research thoroughly explored the theoretical capacities of AI and isolated digital tools, current secondary literature remains fragmented. Most existing overviews present sequential summaries of independent technical trials rather than a unified synthesis of pedagogical impacts. The primary research gap lies in the scarcity of comprehensive systematic frameworks that evaluate the post-pandemic digital shift. The rapid, forced digitalization caused by COVID-19 completely transformed institutional infrastructures and accelerated AI adoption at an unprecedented pace. Consequently, there is an urgent need to systematically map out how these multi-layered operational benefits and socio-ethical challenges intersect in empirical data. This study addresses this gap by executing a structured systematic literature review of post-2021 empirical research, establishing a solid theoretical foundation for sustainable institutional adoption.

3. Methodology

3.1. Research Design and Framework

To ensure methodological rigor, transparency, and reproducibility, this study conducts a Systematic Literature Review (SLR) aligned with the PRISMA 2020 Statement (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). Moving away from an unstandardized or binary perspective, this methodology systematically identifies, evaluates, and synthesizes empirical research regarding the educational implications of Artificial Intelligence (AI), balancing reported pedagogical benefits against structural challenges.

3.2. Search Strategy and Data Sources

Electronic database searches were systematically executed across primary academic indexes and search engines, including Google Scholar, Scopus, ScienceDirect, and the IEEE Xplore Digital Library. The search timeframe was strictly restricted to peer-reviewed literature published between January 2021 and May 2026, capturing the critical post-pandemic era marked by accelerated digital transformation. To isolate relevant

literature, specialized Boolean search strings were deployed within the metadata fields (Title, Abstract, and Keywords):

("Artificial Intelligence" OR "AI" OR "Machine Learning") AND ("Education" OR "Higher Education" OR "Pedagogy") AND ("Benefits" OR "Challenges" OR "Perceptions" OR "Impact")

3.3. Inclusion and Exclusion Criteria

To establish a cohesive and methodologically sound corpus of studies, explicit eligibility criteria were applied during the screening process:

Table 1. Inclusion and exclusion criteria

CRITERION	INCLUSION CRITERIA	EXCLUSION CRITERIA
TIME FRAME	Published between 2021 and 2026 (post-COVID-19 era).	Published before 2021.
STUDY TYPE	Empirical studies, peer-reviewed journal articles, systematic reviews, and official institutional reports.	Op-eds, opinion blog posts, non-peer-reviewed white papers, and patents.
FOCUS	Direct application of AI tools in educational settings, academic perceptions, and learner outcomes.	Purely technical computer science papers, algorithmic development without educational context, or AI in non-educational fields (e.g., healthcare, retail).
LANGUAGE	Full-text available in English or French.	Documents in other languages without official translations.

Note. Elaborated by the author.

3.4. Screening Process and Study Selection (PRISMA Flow)

The selection process followed a strict four-stage screening pipeline to ensure transparency:

1. **Identification:** The initial database search yielded bibliographic records across the selected indexes.
2. **Deduplication:** Automated software tools removed duplicate entries across databases.
3. **Title and Abstract Screening:** The remaining records were screened based on title and abstract relevance, eliminating studies that did not explicitly align with educational implications.
4. **Full-Text Eligibility:** Full-text documents were thoroughly analyzed to ensure compliance with the inclusion criteria, resulting in a final analytical sample of **(N = 20) core studies**.

3.5. Data Extraction and Synthesis Approach

Data from the 20 included studies were extracted using a standardized matrix, capturing: author(s), publication year, specific AI technology examined, research design (qualitative, mixed, or systematic review), and primary educational outcomes. Rather than presenting these studies as an isolated descriptive list, the data underwent a thematic synthesis. Findings were categorized into cross-cutting operational themes—such as personalization, linguistic acquisition, administrative efficiency, cognitive

reliance, and algorithmic ethics—providing a comprehensive interpretive framework for the subsequent sections.

4. Results

4.1. Operational Classification Criteria

To synthesize the empirical findings without enforcing an overly binary division, the twenty included studies were evaluated based on their primary analyzed outcomes. Studies were classified under "Pedagogical and Operational Benefits" if their primary datasets demonstrated statistical improvements in student performance, administrative efficiency, or learning accessibility. Conversely, studies were categorized under "Pedagogical Challenges and Socio-Technical Risks" if their focal findings identified systemic vulnerabilities, cognitive degradation, psychological stressors, or ethical discrepancies. See table 02.

*Table2.*Thematic Synthesis of Included Empirical Studies on Educational AI

AUTHORS	METHOD	PRIMARY SYNTHESIZED FINDINGS
PEDAGOGICAL & OPERATIONAL BENEFITS		
(FARAHANI MS, 2024)	Document Review	Enables curriculum personalization, facilitates adaptive learning systems through real-time feedback, and provides scalable virtual tutoring at lower operational costs.
(SLIMI, 2023)	Qualitative (Survey)	Enhances graduate employability skills, automates heavy administrative workflows, and optimizes knowledge acquisition in higher education.
(SARAH ABOU KARROUM, 2024), (DEGNI, 2024)	Mixed-Methods	Facilitates specialized teacher training architectures, builds individualized learning experiences, and improves assistance for learners with special needs. Demonstrates positive impacts on individual student learning outcomes and assists faculty in creating professional development modules.
((HELEN CROMPTON, 2023) (CHEN, 2023), (GOKCEARSLAN, 2024), (SULTAN, 2023), (SANG JOON LEE, 2024)	Systematic Review	Documents significant positive contributions of AI tools to modern language learning, automated assistants, and institutional student management. Enhances scalable personalized instructional support, establishes a non-judgmental learning environment, and elevates overall assessment quality. Notes that conversational AI chatbots heavily boost student learning motivation, improve linguistic fluency, and optimize instructional design tasks. Identifies intelligent tutoring systems (ITS) as highly effective tools for optimizing knowledge retention and pedagogical delivery. Synthesizes successful practices of integrating AI projects and project-based learning dynamics into modern classrooms.

PEDAGOGICAL CHALLENGES & RISKS

(GAINET, 2025) (JULIE A. DELELLO, 2025)	Qualitative Approach	Warns that unmonitored institutional AI integration can exacerbate digital divides and reduce equity in learning opportunities. Links sudden or unguided exposure to digital conversational agents with heightened student anxiety and increased social isolation.
(BASHA, 2024) (CHUNPENG ZHAI, 2024) (P. SASIKALA, 2024) (BABLU KARAN, 2023)	Systematic Review	Demonstrates that over-reliance on automated tools reduces student critical thinking capacities and lowers real-life academic performance. Identifies structural cognitive degradation and diminished cognitive abilities resulting from chronic over-reliance on dialogic AI software. Highlights critical socio-technical challenges, including data privacy vulnerabilities, algorithmic bias, and systemic barriers to technology equity. And establishes six core risk dimensions: deepfakes, algorithmic biases, privacy vulnerabilities, accuracy risks, loss of social skills, and the destabilization of faculty roles.
(LIANG, 2023) (PLACIDE, 2024)	Analytical Approach	Reports negative impacts on student academic morale and identifies a distinct loss of creative problem-solving capabilities. Documents negative implications regarding data confidentiality, ethical institutional use, and the erosion of individual analytical skills.
(MUHAMMAD ABBAS, 2024)	Mixed-Methods	Indicates that generative platforms (e.g., ChatGPT) trigger tendencies for academic procrastination, memory loss, and lower grades.
(MOLENAR, 2024), (MICHAEL. LITTMAN, 2021)	Analytical Report	Highlights the danger of proprietary "black box" algorithms, leaving educators and students unaware of evaluation mechanics. Identifies risks from deepfakes, unaccountable systems, algorithmic discrimination, and the reinforcement of pre-existing social biases.

Note: Elaborated by the author.

4.2. Synthesis of General Trends

The systematic tracking of the empirical corpus indicates that while the absolute volume of early post-pandemic research leaned heavily toward exploring functional efficiencies, critical contemporary literature is rapidly expanding. The focus has systematically shifted from celebrating basic automation toward highlighting deep psychological, ethical, and cognitive vulnerabilities.

5. Discussion

The multi-layered evidence extracted from this systematic review challenges the initial simplified view of AI as a merely advantageous tool. Rather than evaluating AI through a binary lens, a critical interpretation of the literature requires viewing it as an inevitable, socio-technical shift whose pedagogical outcomes are highly dependent on the quality of institutional management. When looking at the broader picture, the documented benefits are clearly structured around three primary pillars: curricular personalization, instructional automation, and linguistic support. The findings of Farahani (2024) and Chen (2023) converge to show that adaptive algorithms effectively address the diversity of classrooms by adjusting instructional speed in real time. This operational capability is closely linked to the language learning advancements identified by Crompton (2023) and Gokcearslan (2024), where conversational agents create a non-judgmental environment that lowers affective barriers and improves student motivation. Furthermore, the administrative optimizations highlighted by Slimi (2023) and Abou Karroum (2024) show that AI can successfully reduce faculty workloads, creating space for direct human

mentorship. However, cross-examining these findings reveals a sharp set of structural tensions within current research. While Chen (2023) celebrates the expansion of personal support, empirical data from Abbas (2024), Basha (2024), and Zhai & Wang (2024) provide a strong counter-argument. These researchers show that excessive reliance on generative platforms often acts as a major cognitive risk, leading to student procrastination, memory loss, and a significant decline in independent critical thinking. This tension indicates that the time saved by automation can easily result in cognitive disengagement if the tool replaces, rather than enhances, the student's analytical effort. Additionally, the social and ethical dilemmas identified in the reports of Molenaar (2024) and Littman (2021) show that the operational benefits of AI are often undermined by algorithmic opacity. The use of proprietary "black box" technologies leaves educators unable to assess the fairness or accuracy of student evaluations, creating serious risks of bias and discrimination. This directly challenges the claims of equity, as supported by Gainet (2025) and Karan (2023), who warn that unequal technological access and algorithmic biases can easily reinforce existing socio-economic inequalities.

Finally, these findings require a careful reconsideration of this study's initial hypothesis, which suggested that the advantages of AI outweigh its disadvantages, leading to unconditioned preference among academics. The synthesized empirical data demonstrates that this initial premise is overly optimistic and incomplete. While academics value the administrative time saved and the personalization of learning pathways, they remain deeply concerned by the long-term cognitive dependencies, privacy risks, and erosion of critical thinking skills documented by researchers like Delello (2025) and Sasikala (2024). Consequently, the evidence suggests that the benefits of AI do not automatically outweigh its risks; rather, the positive outcomes of AI in education are strictly conditioned on establishing rigorous ethical guidelines and maintaining the central pedagogical authority of human educators.

5. Conclusion

The rapid, forced digital transition in the post-COVID-19 era has fundamentally accelerated the structural dependency of educational institutions on Artificial Intelligence and machine learning infrastructures. As demonstrated through this systematic literature review, the educational implications of AI cannot be understood through a simplistic binary framework. While the compiled empirical evidence underscores substantial benefits—including enhanced pedagogical personalization, language acquisition efficiencies, and the welcome optimization of faculty administrative workloads—these operational milestones are heavily countered by severe socio-technical challenges. The systematic cross-examination of the literature reveals that unchecked AI adoption introduces substantial cognitive risks, such as acute student procrastination, critical thinking deficits, and memory loss, alongside systemic challenges regarding data privacy vulnerabilities and proprietary algorithmic opacity. Consequently, the findings of this review indicate that the actualization of AI's

educational benefits is strictly conditional upon the establishment of rigorous, human-centered ethical governance. To transition from a posture of digital vulnerability to sustainable pedagogical innovation, academic institutions and policymakers must collaborate to operationalize targeted structural frameworks. First, developers and academic leaders must ensure absolute transparency by designing AI platforms rooted in explainable algorithms, thereby dismantling the "black box" mechanics that obscure student evaluations and reinforce systemic biases. Second, digital infrastructures within schools and universities must be engineered to strictly respect data confidentiality and cultural equity, guaranteeing that automated tools support diverse student bodies without worsening pre-existing digital divides. Finally, it is imperative to cultivate a culture of open multidisciplinary trust among software engineers, educators, and ethicists. Ultimately, technological deployment must never replace the core instructional authority or pastoral responsibility of human teachers; rather, ethics must serve as the foundational guide to ensure that artificial intelligence remains a tool that enhances, rather than diminishes, human cognition and academic integrity.

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Technology-Mediated Motivation in English Language Learning: Teachers' and Students' Perceptions in Two Central Algerian Universities

Snani NOURHANE*, Merdjani IMANE*, Boukhechba HICHAM*, MÉSZÁROS György*,
BASKA Gabriella*

Abstract

This study investigates the perceptions and motivation of both teachers and students regarding the use of technology in English language instruction at two central Algerian universities, Ziane Achour University of Djelfa and Ammar Theliji University of Laghouat. Technology has become an increasingly influential force in higher education, yet its motivational role in under resourced English language learning contexts remains insufficiently understood. In this study, technology refers to educational digital tools used in English language learning, including multimedia resources, mobile applications, online platforms, presentation tools, and communication technologies. Employing a qualitative research design, data were collected through semi structured interviews with fifteen university teachers and focus group discussions with twenty five students from the English Language departments in the selected universities. Analysed using Braun and Clarke's (2006) reflexive thematic analysis. The findings reveal that both teachers and students generally perceive technology as a powerful motivational and pedagogical resource that supports engagement, autonomy, and collaboration. At the same time, the results highlight persistent challenges, including limited resources, inadequate training, and unsupportive institutional environments. The study concludes that although there is strong support for integrating technology into English language education, its motivational effectiveness depends substantially on institutional support, digital literacy, and balanced pedagogical implementation rather than on access to technology alone.

Keywords: motivation, technology integration, English language learning, higher education, Algeria.

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- PhD Candidate, Faculty of Education and Psychology, ELTE, Eötvös Loránd University. Budapest, Hungary. Nourhanes@student.elte.hu
 - PhD Candidate, Taleb Abderrahmane-Laghouat Teacher's Higher School, Laghouat, Algeria, imanemerdjani57@gmail.com
 - Associate Professor, Dr., Ziane Achour University, Djelfa, Algeria, h.boukhechba@univ-djelfa.dz
 - Associate Professor, Dr., Faculty of Education and Psychology, ELTE, Eötvös Loránd University. Budapest, Hungary. meszaros.gyorgy@ppk.elte.hu
 - Associate Professor, DR., Faculty of Education and Psychology, ELTE, Eötvös Loránd University. Budapest, Hungary. baska.gabriella@ppk.elte.hu



Introduction

Over the last few decades, the rise of digitalization has introduced new pedagogical possibilities that extend beyond the traditional classroom, enabling teachers and students to interact, communicate, and construct knowledge in increasingly innovative ways (Selwyn, 2016). Within the field of English language education, digital technologies ranging from mobile learning applications and virtual classrooms to online communication platforms have opened new opportunities for English as a Foreign Language (EFL) learners by providing authentic exposure to language use and supporting learner centred experiences (Kukulka, Hulme & Shield, 2008; Warschauer & Kern, 2000).

Observing the visible advancement of innovation in the field, motivation seems to be measured to determine the success of implementation. Motivation is a complex construct shaped not only by individual factors but also by broader contextual, institutional, and cultural influences. Crucially, the same digital tool may support or undermine engagement depending on the infrastructure, training, and support surrounding its use. Teachers' motivation to use technology is particularly important in this respect, as it directly affects the quality and depth of its implementation in educational settings (Ertmer & Ottenbreit, Leftwich, 2010). This study therefore treats institutional, pedagogical, and technical conditions as integral to, rather than separate from, the motivational process.

Although a substantial body of research has examined the relationship between technology and motivation in language learning, most studies have been conducted in Western and Asian contexts, where stable technological infrastructure is often assumed (Lai, 2015; Lin et al., 2016). In contrast, less attention has been given to developing and under resourced educational systems, where access to technology, teacher training, and institutional support may be uneven. In Algeria, existing research has primarily focused on technology integration and teachers' attitudes (Bouziane, 2013; Kadi & Khouni, 2022), with limited exploration of how both teachers and students perceive the motivational role of digital tools.

This study therefore aims to examine the motivation and perceptions of English language teachers and students regarding technology use in two central Algerian universities: Ziane Achour University of Djelfa and Ammar Theliji University of Laghouat. Adopting a qualitative research approach, the study seeks to capture participants' lived experiences and the contextual factors shaping their attitudes toward technology in language teaching and learning. Semi structured interviews with teachers and focus group discussions with students were conducted to generate in depth insights into their motivations, challenges, and expectations.

The significance of this study lies in its contribution to the growing international body of research examining the relationship between technology and motivation in education, particularly within underrepresented contexts such as Algerian higher education. Accordingly, this study addresses the following research questions:

1. How do teachers and students at the selected central Algerian universities perceive the role of educational digital tools in English language teaching and learning?
2. How do these digital tools influence students' motivation in terms of autonomy, competence, and relatedness?
3. What institutional, pedagogical, and technical factors support or limit the motivational value of technology in English language education?

Through these questions, the study aims to shed light on the intersection of motivation and technology use in central Algerian higher education

Literature Review

Technology in Education

Technology enhanced learning encompasses a wide range of digital tools, including learning management systems (LMS), mobile applications, and multimedia resources, which aim to improve accessibility, engagement, and instructional effectiveness (Kirkwood & Price, 2014). Research suggests that technology can reshape classroom dynamics by enabling more interactive and participatory forms of learning. Digital environments allow learners to engage with content through multiple modes, visual, auditory, and textual, hereby supporting diverse learning preferences and increasing engagement (Means et al., 2014). In addition, technology expands access to authentic materials and real world language use, particularly in language education, where exposure to meaningful input is essential (Chapelle, 2003). This expanded access allows learners to move beyond textbook based instruction and engage with language in more contextualized and relevant ways.

However, the research consensus is not that access alone is sufficient. While Means et al. (2014) and Chapelle (2003) emphasize the affordances of digital tools, other scholars caution that these affordances are only realized under conditions. The successful integration of technology is not determined solely by the availability of digital tools but depends on pedagogical alignment, teacher competence, and institutional support (Ertmer & Ottenbreit Leftwich, 2010). Without clear instructional strategies and adequate training, technology may remain underutilized or serve only a supplementary function. Furthermore, disparities in infrastructure, access, and digital literacy continue to create uneven learning opportunities, particularly in under resourced educational contexts (Selwyn, 2016). Taken together, this body of work suggests that technology should be understood not as a standalone solution but as one component of a broader educational ecosystem a position that directly motivates the present study's attention to institutional and contextual conditions.

Motivation in Education

Motivation is widely recognized as a key determinant of students' engagement, persistence, and academic achievement. It refers to the internal and external processes that initiate, guide, and sustain learning behaviours over time (Ryan & Deci, 2000).

Educational research commonly distinguishes between intrinsic motivation, which arises from genuine interest or enjoyment in a task, and extrinsic motivation, which is driven by external rewards or pressures such as grades or recognition. While both forms contribute to learning, intrinsic motivation is generally associated with deeper engagement, creativity, and long term knowledge retention (Ryan & Deci, 2017).

Motivation is also shaped by contextual factors such as teaching practices, classroom climate, and institutional conditions. Teachers play a crucial role in fostering motivation by designing engaging activities, providing constructive feedback, and creating inclusive and supportive learning environments. Consequently, motivation should be understood as both an individual and contextual phenomenon, influenced by the interaction between learners and their educational environment (Schunk, Meece, & Pintrich, 2014). This dual character of motivation, simultaneously psychological and environmental, is precisely what makes context sensitive investigation necessary in settings where institutional conditions vary widely.

Technology and Motivation in Education

Building on these perspectives, the relationship between technology and motivation has been widely examined through empirical research in diverse educational contexts. Studies consistently show that digital tools can enhance learners' engagement by creating more interactive, flexible, and accessible learning environments. For example, Lin et al. (2016) found that mobile assisted language learning (MALL) significantly increased students' intrinsic motivation and engagement, particularly when learners were able to control the pace and location of their learning. Similarly, Al-Shehri (2017) reported that students using online learning platforms and discussion forums demonstrated higher levels of participation and sustained interest compared to those in traditional classroom settings.

In higher education contexts, Jeno et al. (2019) found that the use of digital learning environments positively influenced students' motivation by supporting autonomy and competence, two key dimensions of Self Determination Theory. Likewise, Dörnyei and Ushioda (2011) highlight that technology mediated learning environments can promote sustained motivation in language learning by making tasks more relevant and engaging. These findings converge on the claim that digital tools can create conditions that encourage active participation and persistence.

This largely optimistic literature is, however, contested. Kirschner and De Bruyckere (2017) argue that excessive or poorly structured use of technology can lead to cognitive overload and reduced attention, ultimately undermining motivation, and Selwyn (2016) cautions that technology may reinforce existing inequalities where access and digital competence are uneven. The tension between the optimistic findings of Lin et al. (2016) and Jeno et al. (2019) and the cautionary positions of Kirschner and De Bruyckere (2017) and Selwyn (2016) is instructive; it indicates that technology does not automatically enhance motivation, and that its effect is conditional on implementation and support.

This conditionality is the gap the present study addresses in a context where those supporting conditions cannot be taken for granted.

Technology Integration and Motivation in Algeria

Technology integration in Algerian higher education remains uneven, shaped by infrastructural limitations, institutional policies, and evolving pedagogical practices. While national reforms have emphasized the importance of digitalization, the actual implementation in universities is often constrained by limited access to reliable internet, insufficient technological equipment, and a lack of continuous professional development for teachers (Bouziane, 2020; Khelfaoui, 2009). Many instructors still rely on traditional, lecture based approaches, with technology primarily used for basic tasks such as presentations rather than interactive or student centred learning (Bensaid & Brahimi, 2013).

However, recent years have witnessed a gradual shift, particularly accelerated by global digital trends and the COVID-19 pandemic, which pushed universities toward online and blended learning environments (UNESCO, 2021). Despite these advancements, disparities persist between institutions and regions, reflecting broader socio economic inequalities. Students are often more digitally engaged outside the classroom, yet this familiarity is not fully capitalized pedagogically (Bouziane, 2020). This gap between students' everyday digital fluency and its limited academic uptake is one of the specific tensions the present study examines empirically.

Theoretical Framework and Research Gap

This study draws primarily on Self Determination Theory (Deci & Ryan, 2000) as a framework for understanding how technology influences motivation among central Algerian teachers and students. SDT holds that intrinsic motivation is fostered when three psychological needs are satisfied: autonomy, competence, and relatedness. The framework adopted here specifies how each need maps onto technological affordance. Autonomy is supported when digital tools allow learners to control the pace, place, and direction of their study; for example, through self paced multimedia, mobile applications, and on demand access to materials. Competence is supported when tools provide structured practice, immediate feedback, and visible progress, allowing learners and teachers to experience knowledge themselves. Relatedness is supported when communication and collaboration tools enable meaningful interaction among learners and between learners and teachers (Reeve, 2012; Jeno et al., 2019; Ryan & Deci, 2020).

Crucially, this study extends the standard SDT account by foregrounding the contextual mediation of these needs. In low resource settings, need satisfaction cannot be treated as a purely psychological matter, because a learner cannot exercise technology supported autonomy without reliable access; a teacher cannot build a sense of competence with digital tools without adequate training and recognition. The framework therefore treats institutional, pedagogical, and technical conditions not as background

variables but as the enabling (or constraining) infrastructure of need satisfaction itself. This theoretical move integrates the institutional dimension directly into the motivational account and provides the conceptual basis for the study's third research question.

Methodology

Research Design

This study adopts a qualitative research design grounded in an interpretive paradigm. The purpose of qualitative inquiry is to explore individuals' subjective experiences, perceptions, and motivations within their natural settings (Creswell & Poth, 2018). Given the exploratory nature of this research, qualitative methods were deemed most appropriate to capture the complexity of teachers' and students' attitudes toward technology use in English language teaching and learning (Denzin & Lincoln, 2018).

Participants and Sampling

The study was conducted at two public Algerian universities located in the central region of the country: Ziane Achour University of Djelfa and Ammar Theliji University of Laghouat. Both institutions offer undergraduate and postgraduate English language programs and share broadly comparable characteristics, similar regional location, public funding structures, student profiles, and infrastructural conditions, which makes them informative cases for examining technology mediated motivation in central Algerian higher education. Rather than serving as statistically representative samples, they were selected as information rich sites that reflect the typical resourcing and institutional conditions of universities in this region. Their selection was also guided by feasibility and the researcher's access to both institutions, which enabled sustained, in depth engagement with participants; the implications of this access based selection are addressed explicitly in the Limitations section.

The participants consisted of 15 English language teachers and 25 English major students. Recruitment followed a purposive sampling strategy, which is widely used in qualitative research to identify participants who possess relevant experience and can provide meaningful data (Palinkas et al., 2015). Teachers were recruited based on their active involvement in teaching English at the university level and were approached directly by the researcher through departmental contacts; participation was voluntary. Students were recruited from third year undergraduate and master's programs, as these levels had sufficient academic exposure to evaluate the role of technology in their learning; they were invited to participate through course coordinators and self selected into the focus groups on a voluntary basis.

The sample size was guided by the principle of data saturation, understood within reflexive thematic analysis as the point at which additional data cease to generate new codes or substantively new themes (Braun & Clarke, 2006). Data collection and preliminary analysis proceeded iteratively, and recruitment continued until the

interviews and focus group discussions were no longer yielding new analytical insights relevant to the research questions. By the final interviews and the third focus group, recurring patterns were clearly established and no new themes emerged, indicating that the corpus generated by 15 teachers and 25 students was sufficient to support a rich and credible thematic account for the two sites under study. The demographic characteristics of participants are summarized in Tables 1 and 2.

Table 1: *Teachers' Profile (n = 15)*

Variable	Category	Frequency
Gender	Male	6
	Female	9
Teaching Experience	1–5 years	4
	6–10 years	6
	Over 10 years	5
University	Ziane Achour (Djelfa)	8
	Ammar Theliji (Laghouat)	7

Table 2: *Students' Profile (n = 25)*

Variable	Category	Frequency
Gender	Male	9
	Female	16
Study Level	3rd-year BA	15
	Master's	10
University	Ziane Achour (Djelfa)	12
	Ammar Theliji (Laghouat)	13

Ethical Considerations

The study followed well established ethical principles to guarantee the protection of human subjects. Ethical permissions were obtained from both universities, signed by the head of department. Prior to data collection, all participants were informed of the study's purpose, the voluntary nature of participation, and their right to withdraw at any point without consequence. Informed consent was obtained from every participant, and all interviews and focus group discussions were audio recorded only after consent had been granted. To protect confidentiality and anonymity, participants' identities were anonymized using pseudonyms and labels (e.g., Teacher 1, Student 1), and no personal identifying information is reported. Audio recordings, transcripts, and field notes were stored securely and accessed only by the researcher.

Data Collection Instruments

Two qualitative instruments were employed. Semi structured interviews with Fifteen teachers in individual interviews lasting approximately 30–40 minutes each. The interview protocol included open ended questions focusing on their perceptions of technology use, motivational factors, institutional support, and pedagogical challenges. This format allowed flexibility to probe emerging themes and clarify responses.

Moreover, three focus group sessions were organized, each involving 8–10 students. Discussions lasted approximately one hour and explored students' motivation, attitudes, and experiences with technology in their English studies. Focus groups were chosen because they encourage interaction and reflection among participants, revealing both shared and contrasting perspectives (Morgan, 1997).

All interviews and focus groups were conducted in English and recorded with participants' consent. Notes were taken to capture nonverbal cues and contextual details.

Data Analysis

Data were analysed using Braun and Clarke's (2006) reflexive thematic analysis, following its six phases: familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report.

In Phase 1, all interviews and focus group recordings were transcribed and read multiple times to ensure accuracy and familiarity, and initial impressions related to motivation, technology use, and institutional context were recorded in a reflective journal. In Phase 2, transcripts were systematically coded line by line, with relevant segments assigned descriptive codes such as "enhanced motivation," "technological barriers," "teacher enthusiasm," and "student autonomy" (Nowell et al., 2017). Phase 3 involved grouping these codes into broader categories, producing preliminary themes such as "technology as a motivator" and "institutional constraints," supported by thematic mapping.

During Phase 4, themes were reviewed and refined for coherence; overlapping themes were merged, while others were divided into sub themes to capture differences between teachers and students. In Phase 5, themes were clearly defined and supported with participant accounts, and in Phase 6 the findings were synthesized into a coherent narrative aligned with Self Determination Theory (Deci & Ryan, 2000). Cross case comparison between the two institutions, and between teachers and students, was conducted throughout to identify convergences and divergences in perspective.

Findings

This section presents the findings from the semi structured interviews and the focus group discussions. Four themes were constructed from the data: Technology as a Motivational Catalyst, Teacher Motivation and Pedagogical Adaptation, Institutional and Technical Challenges, Digital Literacy and Training Gaps. Within each theme, teachers'

and students' perspectives are reported separately to clarify where the two groups converged and differed.

Technology as a Motivational Catalyst

Students across all three focus groups consistently identified technology as a key source of engagement and enjoyment. They expressed enthusiasm for digital tools such as YouTube, Quizlet, and interactive presentations, noting that these resources made learning more dynamic and varied than textbook based instruction. Students particularly valued the flexibility that technology afforded, describing how it allowed them to access content independently and continue learning beyond the classroom. This sense of being able to direct their own study was a recurring source of motivation.

Teachers echoed and extended this view from a pedagogical standpoint. They emphasized that multimedia materials increased learners' exposure to authentic language and helped sustain attention during lessons. Teachers also observed that digital environments promoted interaction through collaborative tasks, online discussions, and group activities. One teacher noted that students "feel in control of their learning" when using digital materials, linking the tools directly to learner engagement.

Teacher Motivation and Pedagogical Adaptation

This theme was constructed primarily from the teacher interviews. Most teachers reported strong motivation to integrate technology, viewing it as both a pedagogical enhancement and a professional necessity. Those who had successfully used digital tools described feelings of satisfaction and professional growth, framing technology as a source of innovation and continuous learning. At the same time, teachers reported varying levels of confidence and institutional support. One teacher observed that while technology helped diversify lessons and maintain engagement, reliance on personal devices and personal internet access was discouraging. Several teachers also described an adaptive tension between established teaching practices and emerging digital approaches, and some reported resistance from colleagues or administrators who perceived technology as distracting or incompatible with academic rigour.

Students contributed to this theme indirectly. They were attentive to differences in how their teachers used technology, observing that lessons were more engaging when teachers integrated digital tools confidently and purposefully, and less so when use was hesitant or purely supplementary.

Institutional and Technical Challenges

Students expressed clear frustration when technical issues disrupted lessons, describing how unreliable internet connectivity and equipment failures interrupted activities and diminished their engagement. For students, these disruptions were experienced as breaks in the flow and momentum of learning.

Teachers emphasized the structural roots of these problems, pointing to the absence of stable infrastructure, outdated equipment, limited access to projectors, and insufficient

administrative support. One teacher remarked that such disruptions “kill the rhythm of learning,” capturing how technical failure undermined the continuity of instruction. Teachers also linked these conditions to fatigue and diminished enthusiasm over time.

Digital Literacy and Training Gaps

Teachers reported that they had acquired most of their digital skills through self training or informal peer support rather than through structured institutional programs. Where training did exist, they noted that it tended to focus on technical operation rather than on the pedagogical integration of technology, leaving a gap between knowing how to operate a tool and knowing how to use it to support learning.

Students, by contrast, described themselves as confident in everyday digital use but markedly less confident in applying technology for academic purposes. As one student observed, frequent smartphone use did not necessarily translate into effective learning strategies. Students thus identified a gap between digital familiarity and academic digital competence.

Cross Case Comparison: Djelfa and Laghouat

Because the study spanned two institutions, the analysis attended throughout to possible divergence between Ziane Achour University of Djelfa and Ammar Theliji University of Laghouat. On the available evidence, the four themes emerged consistently across both sites, and no substantive divergence was identified in how teachers and students perceived the motivational role of technology or the constraints surrounding it. Participants at both universities described comparable enthusiasm for digital tools, similar variation in teacher confidence, and the same categories of institutional and infrastructural barriers.

This cross-site consistency suggests that the motivational dynamics and structural constraints reported here are not idiosyncratic to a single campus but reflect conditions shared across comparable central Algerian universities, strengthening the transferability of the findings to similar institutions in the region.

Discussion

The four themes, interpreted through Self Determination Theory (Deci & Ryan, 2000), indicate that technology functions as both a motivational enhancer and a contextual constraint in central Algerian English language education. This section interprets each theme against the theoretical framework and the wider literature before drawing the threads together.

The first theme, technology as a motivational catalyst, aligns closely with the autonomy and relatedness dimensions of SDT. Students' valuing of flexible, self paced, independent access reflects autonomy support, while teachers' emphasis on collaboration and interaction reflects relatedness support. This pattern is consistent with empirical research showing that technology can enhance intrinsic motivation by supporting these needs (Jeno et al., 2019; Lai, 2015). Crucially, however, participants'

insistence that motivation was not automatically generated by technology echoes the cautionary literature (Kirschner & De Bruyckere, 2017; Selwyn, 2016) and confirms that need satisfaction was conditional on pedagogical design and access.

The second theme, teacher motivation and pedagogical adaptation, maps onto competence. Teachers' intrinsic motivation was reinforced by successful use of digital tools and eroded by infrastructural and collegial obstacles (Ryan & Deci, 2020). The barriers they described correspond to Ertmer and Ottenbreit-Leftwich's (2010) distinction between first order (material) and second order (attitudinal) barriers, and the resistance they encountered echoes findings that institutional norms can constrain pedagogical change in developing contexts (Bouziane, 2013; Gudmundsdottir & Hatlevik, 2018).

The third theme, institutional and technical challenges, illustrates how external conditions hinder need satisfaction. Unreliable infrastructure undermined both teachers' competence and students' engagement, consistent with Tondeur et al.'s (2017) emphasis on infrastructure and leadership in sustaining technology based innovation.

The fourth theme, digital literacy and training gaps, again implicates competence, inadequate pedagogical training limited teacher innovation, while the absence of academic digital strategies limited student autonomy and capability an instance of the "digital divide within the classroom" (Levy & Stockwell, 2006) that also surfaces in other developing contexts (Howard et al., 2021; Hew & Brush, 2007).

Taken together, these four themes demonstrate that technology functions as both a motivational enhancer and a contextual challenge. The interplay of individual motivation, institutional context, and technological infrastructure forms a complex ecosystem shaping teaching and learning (Tondeur et al., 2017). At the micro level, both teachers and students derived intrinsic satisfaction from the autonomy and engagement technology provided (Jeno et al., 2019; Lai, 2015). At the macro level, institutional factors, access to resources, recognition of effort, and leadership support, shaped how motivation translated into action, while national policies and socio economic conditions influenced the pace and equity of digital integration (Gudmundsdottir & Hatlevik, 2018).

This multi layered structure aligns with Self Determination Theory and extends it by emphasizing the contextual mediation of motivation (Deci & Ryan, 2000; Ryan & Deci, 2020). Autonomy and competence are not solely psychological states but are constructed through the environment: a teacher's autonomy to innovate depends on administrative support, and a student's competence depends on reliable technological access (Howard et al., 2021). In this sense, the study contributes to understanding how motivation operates contextually in developing higher education systems. Unlike Western contexts where infrastructure is often taken for granted, central Algerian teachers and students must navigate technological uncertainty, which makes motivation simultaneously resilient and fragile. Practically, this points toward a policy shift from short term technological interventions to long term motivational ecosystems, in which infrastructure, training, and recognition operate together.

Limitations

The limitations listed below should be taken into consideration when interpreting the findings. While the sample is relatively small, it was sufficient to reach thematic saturation for the sites studied and to generate rich, context specific insight, the findings are not intended to be statistically generalizable to all Algerian universities. The two universities were selected partly based on feasibility and the researcher's access. This access based selection means that other institutions particularly those with markedly different infrastructure or in other regions may present different dynamics.

Focus group settings, while productive for eliciting shared and contrasting views, can be influenced by group dynamics in which more confident participants shape the discussion.

As a characteristic of reflexive thematic analysis, the researcher served as the primary analytic instrument; while trustworthiness procedures were used to mitigate bias, interpretation is inevitably shaped by the researcher's perspective.

Future Research Recommendations

Building on the limitations, and according to the researcher's experience during the enquiry, several directions for future research are suggested. Larger scale and mixed methods studies could complement the present qualitative findings, for example by combining interviews with validated motivational questionnaires to examine how widely the identified patterns hold across different Algerian universities.

Also, longitudinal designs could track how motivation evolves as digital infrastructure and training provision develop over time, distinguishing durable motivational change from short lived effects.

Moreover, Intervention studies evaluating targeted professional development that integrates technical and pedagogical training would help determine which forms of institutional support most effectively convert technological access into sustained motivation.

Conclusion

This study set out to examine how technology mediates motivation in English language education at two central Algerian universities, addressing three research questions. In response to the first research question, concerning how teachers and students perceive the role of educational digital tools, the findings show that both groups regard technology as a valuable pedagogical resource that enhances interaction, supports autonomous learning, and facilitates collaboration, while also recognizing that its value is conditional on the surrounding context.

In response to the second research question, concerning the influence of digital tools on autonomy, competence, and relatedness, the study found that technology strengthened intrinsic motivation when it supported self paced access (autonomy), effective and well supported use (competence), and collaboration and interaction

(relatedness), but that it could undermine motivation when these needs were influenced by poor conditions.

In response to the third research question, concerning the institutional, pedagogical, and technical factors that support or limit technology's motivational value, the findings identify unreliable infrastructure, inadequate and overly technical training, limited resources, and weak institutional recognition of digital innovation as the principal constraints, and supportive leadership, professional development, and reliable access as the principal enablers.

The study advocates a holistic approach that aligns digital infrastructure with motivational psychology and pedagogical innovation, treating motivation not merely as an outcome of technology use but as a driving force that shapes how technology is integrated, sustained, and valued. By cultivating such an ecosystem, central Algerian universities can begin to bridge the gap between aspiration and practice, transforming technology from a symbol of modernization into a genuine instrument of empowerment and educational excellence.

AI Statement: No AI tools were used in this research, moreover, no AI was used in the creation of this manuscript.

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Investigating Linguistic Barriers Hindering Medical English Vocabulary Learning in an English Medium Instruction Context

Naima MERAIHI *, Haron BOURAS **, Abdelbasset DOU ***

Abstract

This study examines the linguistic barriers faced by second-year Algerian medical students in an English as a medium of instruction (EMI) context, specifically those from a French-medium educational background. It also explores students' attitudes towards using artificial intelligence (ai) tools for learning medical English vocabulary and probes the relationship between these attitudes and their perceived linguistic challenges. A quantitative research design was employed, with data collected via a structured questionnaire divided into two sections: one assessing linguistic barriers in medical English and the other evaluating attitudes towards ai-based vocabulary learning tools. Descriptive statistics, reliability analysis, and Pearson correlation tests were used for data analysis. The findings reveal that students experience moderate difficulties in learning medical English, particularly in productive skills such as pronunciation and writing, which may be influenced by their French-medium educational background within an EMI context. Although students expressed generally positive attitudes towards ai-based tools, correlation analysis indicated no statistically significant relationship between AI attitudes and linguistic barriers. These results suggest that while positive perceptions of AI exist, they are insufficient to address the linguistic challenges faced by students. The study underscores the need for coherent EMI implementation and structured pedagogical integration of AI tools to effectively support students transitioning from a French-medium background.

Keywords: Linguistic barriers, medical English, vocabulary, artificial intelligence, English as a medium of instruction.

* Ph.D. Candidate, Languages & Texts Research Laboratory (LanText- University of Annaba) University of Souk-Ahras, Algeria, n.mrayhy@univ-soukahras.dz

** Ph.D. Lecturer, Languages & Texts Research Laboratory (LanText) University of Souk-Ahras, Algeria, haron.bouras@univ-soukahras.dz

*** Ph.D., DSPM Research Laboratory, University of Mostaganem, Algeria, abdelbasset.dou.etu@univ-mosta.dz



1. Introduction

As English has become the global lingua franca, it is no longer regarded as the exclusive property of any one nation. Instead, it serves as a shared resource available to anyone who chooses to use it within their specific context. In this regard, Crystal (2003) asserts that English is the global language, unifying people across nations and disciplines. Indeed, there is widespread consensus that English has solidified its role as the language of science, technology, and travel, transforming the world into a small village. Consequently, its role has expanded as the dominant medium of global communication in both professional and academic spheres. According to Swales (1990), English has become the principal channel of international communication in science. It lies at the heart of globalisation, influencing the ways people work, travel, and communicate. This far-reaching global influence is particularly evident in the medical field, where English has established itself as the primary language for scientific publications, international conferences, and professional training. This underscores the pressing need to adopt English as the medium of instruction within Algeria's medical education system.

Following this line of thought, medical vocabulary learning emerges as a critical aspect of EMI policy. Saville-Troike (1984) emphasizes the importance of vocabulary knowledge in second language learning. In other words, since medical students must use specialised language to communicate with both patients and peers (Ahmed, 2022, p. 50), mastering the meaning, usage, and pronunciation of specialised terms is essential (Zaidi & Al Jadaan, 2022, p. 92). Furthermore, proficiency in medical vocabulary enables students to read reports, complete admission forms, make diagnoses (Hsu et al., 2023), and "tailor admission notes and medication administration records" (Hsieh, 2016, p. 1).

Several scholars emphasise the paramount importance of vocabulary learning (Wilkins, 1976; Kaur, 2020). However, vocabulary learning involves not only acquiring an extensive range of words but also retaining them. Memory plays a pivotal role in language learning, and it is important to recognise that there are two types of memory. Short-term memory holds a limited amount of information for a brief period, while long-term memory stores an unlimited amount of information for an indefinite duration. In this regard, words are stored and remembered in a network of associations that can be of various types and linked in different ways. More importantly, medical students should be exposed to meaningful tasks, as the deeper they analyse and process language, the more easily information will be stored in long-term memory.

A substantial body of research has investigated medical vocabulary. On the one hand, numerous studies have explored the characteristics of English for Medical Purposes (EMP) vocabulary (Liu, 2013). On the other hand, many scholars have examined memory strategies, such as chunking, association, repetition, and word-structure techniques and their effects on vocabulary learning. Although these studies are primarily concerned with EMP contexts, their findings are relevant to EMI settings, where medical vocabulary

recognition aids students in decoding and encoding meaning. Despite the growing interest in vocabulary learning and teaching, there is a paucity of studies addressing the linguistic barriers faced by medical students (Zaidi & Al Jadaan, 2022; Askarova, 2023; Abdullah et al., 2013). Notably, no studies have examined the linguistic challenges related to medical vocabulary within the Algerian EMI context, highlighting a clear research gap.

Given its challenging nature, more than one-third of students fail their medical terminology courses (Ahmed, 2022). Consequently, many lose interest in pronouncing, spelling, remembering, and using medical jargon (Abdullah et al., 2013). To address these difficulties, instructors should integrate the latest technological methods for teaching vocabulary (Zafirovska & Xhaferi, 2022). In this respect, Elsanousi et al. (2021) suggest that instructors should be equipped with AI tools to design their courses and interact with students in the classroom.

As one of the driving forces of this era, AI assists teachers in simulating learning, preparing problem-solving activities, and enhancing students' decision-making skills by creating a motivational learning environment (Anggraini & Faisal, 2024). With the advancement of smart technology, AI helps students practice medical vocabulary in real-life scenarios, creating a personalised environment.

In particular, there has been growing interest in exploring the use of AI tools to improve students' vocabulary learning. Research has shown that AI interventions can enhance various aspects of vocabulary acquisition, including learning interest, memory retention (Moore & Calvert, 2000), engagement (Hwang & Wang, 2016), and cognitive load (Wei et al., 2018). For instance, Huang et al. (2021) found that Augmented Reality (AR) and Virtual Reality (VR) improve vocabulary learning by immersing students in an inclusive environment that boosts motivation and engagement. Moreover, while AR flashcards increase vocabulary retention through interactive learning, AR tools also offer contextualised learning situations. Similarly, Majid and Salam (2021) observed that AR flashcards with word identification and pronunciation games motivate learners and make the vocabulary acquisition process more enjoyable. Numerous studies highlight the linguistic and socio-cultural obstacles faced by language learners (Guo et al., 2024). AI tools can assist learners by analysing text, providing support for grammar, syntax, and vocabulary reinforcement, and enabling students to practice meaningful language use (Guo et al., 2024). These AI-powered tools effectively offer immediate linguistic support. Furthermore, AI applications help students structure their thoughts in the target language and engage with new linguistic content. AI's potential for individualised and immediate linguistic support is considered a cornerstone for vocabulary development and second language proficiency. However, research focusing on learners' attitudes towards the use of AI remains limited. More importantly, the attitudes of Algerian medical students towards using AI applications to enhance their vocabulary retention in an EMI context remain largely unexplored, revealing yet another research gap.

In post-pandemic Algerian higher education, significant transformations have emerged regarding e-learning integration, the implementation of EMI, and the transition

toward University 4.0 (Dou et al., 2026; Dou, 2025). Concurrently, researchers have initiated scholarly inquiries into EMP following the official policy shift transitioning the medium of instruction from French to English. This study primarily aims to explore the linguistic barriers faced by Algerian medical students in learning medical vocabulary and their attitudes towards the integration of AI in improving vocabulary retention. A secondary objective is to investigate the correlation between linguistic challenges and students' attitudes towards AI-assisted vocabulary learning.

Accordingly, this study seeks to address the following research questions:

RQ1- What are the major linguistic challenges faced by Algerian medical students in learning medical vocabulary?

RQ2- What are their attitudes towards the use of AI tools in learning medical vocabulary?

RQ3- To what extent are linguistic barriers in medical vocabulary associated with the students' attitudes towards AI-assisted vocabulary learning in an EMI context?

2. Theoretical background

Vocabulary Learning

Vocabulary acquisition plays a crucial role in language learning (Nation, 2013; Schmitt, 2010) and constitutes a central aspect of language teaching. Vocabulary is a sum or stock of words used by individuals or groups in relation to specific subjects. Vocabulary varies depending on the context, whether personal, academic, or professional. As Heibert and Kamil (2005) note, vocabulary also encompasses "the knowledge of the meaning of words" (p. 3), stressing the importance of understanding not only the shape and form of words but their meanings as well.

Moreover, vocabulary knowledge is interlinked with correct pronunciation. Effective communication requires accurate articulation, which connects vocabulary to the four language skills: listening, speaking, reading, and writing. Tankersley (2003) defines vocabulary as "the number of words that we understand or can actively use to listen, speak, read, or write" (p. 52). Vocabulary can thus be categorised into four types, based on the skill through which it is learned: receptive (listening and reading) and productive (speaking and writing). Carter (1998) further elaborates on vocabulary from an orthographic perspective, defining it as "any sequence of letters bounded on either side by a space or punctuation mark" (p. 4).

For effective language acquisition, mastery of vocabulary extends beyond the classroom, particularly in professional and academic contexts. Nation (2001) outlines that comprehensive vocabulary knowledge involves understanding the word's form, meaning, and use, each requiring distinct learning activities. Also, true word knowledge goes beyond its definition; it involves understanding how a word fits into the world. For example, a medical student must not only define "blood vessel" but also use the term appropriately with patients. Thornbury (2002) and McCarthy and O'Dell (1994) also emphasise the importance of understanding a word's form, meaning, and usage, which are essential for effective communication.

The cognitive process of acquiring such vocabulary is often supported by Dual Coding Theory (DCT). As proposed by Paivio (2007), DCT suggests that information is processed through two distinct but interrelated systems: a verbal system for linguistic information and a non-verbal (imagery) system for visual information. In the context of medical English, the simultaneous presentation of a technical term and its visual representation can create dual mental traces, thereby enhancing conceptual clarity and long-term retention compared to text-based learning alone.

Challenges of Learning Medical Vocabulary

Vocabulary learning in contexts such as English for Specific Purposes (ESP) and English as a Foreign Language (EFL) poses significant challenges, particularly in medical education. Students must master a large set of technical terms while simultaneously using English to engage with complex subject matter in EMI settings. Stahl and Nagy (2006) argue that "vocabulary is one of the primary challenges facing students who come from non-English-speaking homes" (p. 6), with limited exposure to medical English and the technical complexity of its terms inhibiting vocabulary acquisition.

McCarthy and O'Dell (1994) identified several common factors that significantly impact vocabulary acquisition, particularly in the context of learning medical terminology. Spelling difficulties can arise due to the complex orthographic patterns of medical terms, such as '*diarrhea*,' '*arrhythmia*,' and '*haemorrhage*,' which often constitute challenges for non-native speakers. Phonological difficulties also hinder students' ability to accurately pronounce medical vocabulary, particularly words with sound clusters like "*sphygmomanometer*" and "*thrombosis*," affecting their confidence in oral communication. Additionally, syntactic difficulties can interfere with students' ability to use medical terms correctly in grammatically appropriate contexts, as some words require flexible combinations while others demand more complex sentence structures. Semantic links, where terms appear similar but have distinct meanings, can further complicate matters, as evidenced by the confusion between "*make*" and "*do*" in medical contexts, such as "*make a check-up*" versus "*do a check-up*." Lastly, false friends (words that share similar forms but differ in meaning across languages) create another challenge, as seen in the confusion between "*actually*" (meaning "*really*" in English) and "*actuellement*" (meaning "*currently*" in French).

These overlapping difficulties collectively impact students' ability to master medical vocabulary and apply it accurately in both written and spoken communication. Beyond these categorical linguistic obstacles, the literature on EMP emphasizes that it is crucial for trainers to prepare students to use English effectively in both academic and professional contexts (Hyland, 2006). According to ESP theory (Dudley-Evans & St John, 1998), EMP course design should be based on an analysis of students' current language needs, academic requirements, and future professional demands. The authors posit that medical students need to acquire specialised vocabulary because it is vital for their professional and academic development. It enables them to write case histories, interact

with patients and colleagues in foreign hospitals, and participate in clinical discussions and international conferences. Drawing from the aforementioned challenges, this study suggests that medical students must not only learn medical vocabulary but also apply it accurately in different communicative contexts, overcoming potential linguistic barriers that may hinder comprehension and communication. As they must navigate distinct registers (e.g., between doctor-patient and doctor-doctor communications), mastering these nuances is essential.

For Algerian students transitioning from French-Medium Instruction (FMI), the linguistic transition to English presents a unique set of challenges characterized by both facilitation and interference. Phonologically, the interference is significant; French is a syllable-timed language with a relatively flat intonation, whereas English is stress-timed and relies heavily on vowel reduction and word-level stress (Walker, 2011). This often leads to difficulties in 'phonological decoding,' where students apply French pronunciation rules to English medical terms. Furthermore, while French and English share an extensive corpus of Greco-Latin cognates in medicine, this 'lexical overlap' can be a double-edged sword. Research into cognate processing suggests that while shared roots can facilitate comprehension, they often trigger orthographic and phonological interference (Gaskell & Marslen-Wilson, 2002). Students may struggle with 'deceptive transparency', assuming that because a word looks similar in French (e.g., *appendicite*) and English (*appendicitis*), the spelling conventions and suffixation are interchangeable, leading to persistent errors in academic writing.

3. Methods

Participants

The study was conducted at the Annex of Faculty of Medical Sciences University of Oum El Bouaghi in Algeria, where a sample of 70 medical students was purposively selected. This sample size represents approximately 60% of the second-year cohort at this specific annex, ensuring a representative profile of the local student population. To account for the study's null correlation findings, a post-hoc power analysis was conducted. For a sample of $N=70$, the study achieves a power of approximately 0.74 to detect a medium effect size ($r=0.3$) at a significance level of $\alpha=0.05$. While the sample size is sufficient for descriptive and exploratory correlation analysis, the findings are interpreted with caution regarding the detection of subtle or weak relationships.

Instruments

Data collection involved two questionnaires, both utilising a five-point Likert scale, designed to address distinct aspects of the study within the EMI context. The first questionnaire targets the linguistic barriers in learning medical vocabulary. It aims to explore the linguistic barriers faced by medical students when learning medical vocabulary in an EMI context. It is adapted from Zaidi and Al Jadaan (2022), with a focus on language-related difficulties encountered while learning and using medical

terminology in English. The questionnaire addresses challenges in areas such as pronunciation, spelling, and syntactic structure, as well as other common difficulties related to medical vocabulary acquisition.

The second questionnaire targets the attitudes towards AI in learning medical vocabulary. It is self-administered and developed by the researchers, theoretically grounded in the Technology Acceptance Model (TAM) originally proposed by Davis (1989). While the original TAM includes multiple constructs such as Perceived Usefulness and Perceived Ease of Use, this study specifically retained the "Attitude towards Use" dimension. This selective approach was chosen because the study's primary objective was to assess students' affective dispositions and readiness, rather than the technical usability of a specific software, which serves as a key mediator for future technology adoption in EMI contexts. To ensure the instrument's validity despite its researcher-developed nature, the items were adapted from validated TAM-based scales used in similar educational technology studies (e.g., Venkatesh et al., 2003) and refined through the aforementioned expert review and pilot testing.

Validity and Reliability

To ensure the validity of the questionnaires, three experienced EMP practitioners were consulted to review the relevance and content validity of the questions. Afterwards, the questionnaires were piloted with a representative sample of the intended participants. The reliability and internal consistency of the questionnaires were assessed using Cronbach's alpha.

The Cronbach's alpha values obtained for the two instruments confirm the validity and reliability of the instruments used in this study. Table 1 shows that for the Linguistic Barriers Questionnaire, the alpha coefficient was greater than 0.80, indicating strong internal consistency. For the Attitudes towards AI Questionnaire, the Cronbach's alpha was also greater than 0.85, suggesting reliable measurement of the students' attitudes.

Table 1. Reliability Statistics

	N. of Items	Cronbach's Alpha
Linguistic Barriers Questionnaire	6	.816
Attitudes Toward AI Questionnaire	6	.858

Prior to conducting the correlation analysis, the data were subjected to the Shapiro-Wilk test to assess normality. The results indicated that the distributions for the composite scores of linguistic barriers and AI attitudes did not significantly deviate from normality ($p > 0.05$). Consequently, Pearson's correlation coefficient (r) was utilized. Its use with 5-point Likert scale data is justified in this context, as the items were aggregated into composite scores, which are treated as interval data in educational and psychological research (Sullivan & Artino, 2013).

4. Results

Table 2 displays the means and standard deviations for items related to the linguistic barriers encountered by second-year medical students from a French-medium background when learning medical English vocabulary in an EMI context. The overall mean score of 3.14 suggests that while these students face moderate challenges in acquiring medical English vocabulary, these difficulties are not overwhelmingly severe. This indicates that students are partially ready to engage with English medical terminology, though persistent obstacles remain.

Linguistic Challenges in Medical Vocabulary Learning (RQ1)

Pronunciation emerges as the most significant challenge, with the highest mean score of 3.59. This finding is consistent with the phonological interference from French, where students often struggle with English stress patterns, vowel quality, and consonant articulation. Writing difficulties (M=3.23) also present significant challenges, likely due to the differences in English spelling conventions and the academic medical norms students are expected to master.

The challenges related to reading and remembering medical vocabulary yielded identical mean scores (M=3.13), suggesting that students face comparable difficulties in both decoding and retaining specialised terms. While many medical terms are derived from Greek and Latin roots common to both French and English, the English-specific orthographic and phonological realizations of these roots likely exacerbate these challenges. Rather than the roots being unfamiliar, the difficulty may lie in the 'morphological mismatch' between the two languages, where the English suffixes, silent letters, and stress patterns differ from the French-medium equivalents the students previously mastered. This creates a cognitive burden where students must 're-learn' the form of a word they already conceptually understand in French. Listening comprehension (M=2.93) and overall vocabulary learning (M=2.82) received lower mean scores, suggesting that students perceive these areas as less problematic. This may indicate a growing familiarity with English input through lectures, digital resources, or AI-based tools, which might be helping students adapt to spoken English more effectively. The data highlight that productive skills are more challenging for students than receptive skills, such as listening and reading. These findings propose a clear need for pedagogical interventions that focus on improving pronunciation, providing structured writing support, and offering explicit vocabulary instruction tailored to students transitioning from a French-medium educational background.

Table 2. Medical Students' Perceptions of Linguistic Barriers

Statement	Mean	Std. Dev.
Medical students from a French-medium background find it difficult to write correctly.	3.23	1.039
Medical students from a French-medium background find it difficult to speak with correct pronunciation.	3.59	0.955
Medical students from a French-medium background find it difficult to understand what they listen to.	2.93	1.138
Medical students from a French-medium background find it difficult to read medical English vocabulary.	3.13	1.162
Medical students from a French-medium background find it difficult to remember medical English.	3.13	1.072
Medical students from a French-medium background find it difficult to learn medical vocabulary.	2.82	1.148

Students' Attitudes Towards AI-Based Vocabulary Learning (RQ2)

Table 3 shows the means and standard deviations for second-year medical students' attitudes towards using AI to learn medical English vocabulary. The results reflect a generally positive attitude towards the use of AI, with mean scores ranging from 3.44 to 3.87 across all items, implying that students perceive AI tools as valuable resources that can alleviate some of the linguistic challenges identified in Table 2.

Table 3. Medical Students' Attitudes towards AI-Based Vocabulary Learning

Statement	Mean	Std. Dev.
I can improve my medical English vocabulary using AI-based applications.	3.44	1.041
AI-based game apps make me enjoy the process of medical vocabulary learning.	3.51	1.090
Using AI flashcards visualizes medical vocabulary for me, which accelerates my understanding.	3.87	0.957
Interacting with AI tools improves my ability to use medical vocabulary appropriately.	3.75	1.011
I recommended using AI-bilingual dictionaries.	3.48	0.887
AI-based applications enhance my writing through providing feedback about appropriate medical vocabulary use.	3.57	0.957

The highest mean score was recorded for the use of AI-based flashcards (M=3.87), reflecting a strong student preference for visual support in vocabulary learning. This is particularly relevant in an EMI context, where students transitioning

from French to English may benefit from multimodal input that they perceive to enhance conceptual clarity and retention. This preference for visualised vocabulary input is consistent with the principles of Dual Coding Theory, as discussed in the theoretical framework of this study, which suggests that combining verbal and visual representations can facilitate more effective learning."

Students also expressed a strong perception that AI interaction could improve their ability to use medical vocabulary appropriately ($M=3.75$) and might enhance writing through feedback ($M=3.57$). These results indicate that students perceive AI tools as a means to support productive skills by providing what they believe to be immediate, personalised feedback, an advantage they identify as often missing in traditional ESP classrooms. Their reports suggest that they view AI tools as not only supporting cognitive outcomes but also potentially addressing affective dimensions such as motivation and anxiety reduction. Enjoyment and engagement were also key factors, with students reporting positive perceptions of AI-based game applications ($M=3.51$). This means that AI tools not only support cognitive outcomes but also address affective dimensions such as motivation and anxiety reduction, which are particularly beneficial for learners dealing with cross-linguistic interference from French. The favourable perception of AI-bilingual dictionaries ($M=3.48$) suggests that these tools can effectively mediate language learning. Rather than being viewed as a crutch, AI-supported bilingual tools are seen as facilitating smoother lexical transfer and comprehension in the transition from French-Medium Instruction (FMI) to EMI.

Correlation Between Linguistic Barriers and AI Attitudes (RQ3)

Table 4 presents the correlation coefficients between students' attitudes towards AI tools and their reported linguistic difficulties in learning medical English vocabulary. The data disclose no statistically significant correlations between students' use of AI-based tools and their self-reported difficulties across all examined language skills, including writing, speaking, listening, reading, remembering, and learning medical vocabulary. The correlation coefficients remain weak and statistically non-significant ($p > 0.05$), suggesting that students' positive attitudes toward AI tools or the perceived usefulness of these tools do not directly reduce their linguistic barriers. For instance, the correlation between the "ability to improve vocabulary using AI" and "difficulty to write correctly" ($r = -0.065$) or "difficulty to speak fluently" ($r = 0.018$) are both weak and statistically non-significant, indicating that the perceived potential of AI tools to improve vocabulary does not translate into an observable reduction in writing and speaking challenges. Similarly, other correlations between AI use and difficulties with listening comprehension, reading medical vocabulary, or remembering terms (all with r -values close to 0) further support the lack of significant impact.

One possible explanation for the absence of significant correlations is the participants' current academic level. As second-year students, they are still adjusting to medical discourse in English while transitioning from a French-medium educational background. This dual challenge may hinder the immediate effectiveness of AI tools, as

students may still be exploring or inconsistently using these technologies, rather than employing them systematically to address their linguistic difficulties. Moreover, linguistic barriers in medical English are multifactorial, influenced by several variables, including prior proficiency in English, exposure to academic medical language, cognitive load, and teaching practices. These factors may have a stronger effect on students' language learning outcomes than attitudinal variables alone, especially during the early stages of medical education.

However, despite the lack of statistical significance, a few weak negative correlations were observed, suggesting that increased interaction with AI tools may be slightly associated with reduced linguistic difficulties. For example, the correlation between "interacting with AI tools" and "difficulty in understanding what they listen to" ($r = -0.087$) or "difficulty in remembering medical English" ($r = -0.015$) reveal a trend of decreasing difficulties as AI interaction increases. While these trends are not conclusive, they point to the potential of AI tools to mitigate linguistic barriers over time, particularly if these tools are integrated more effectively within a structured pedagogical framework.

Table 4. Correlational Statistics

		Ability to improve vocabulary using AI	AI- based game apps	Using flashcards	Interacting with AI tools	AI-bilingual dictionaries.	AI-based feedback
Difficulty to write correctly	<i>r</i>	-0.065	-0.016	0.064	0.055	0.133	-0.034
	Sig.	0.621	0.900	0.623	0.676	0.308	0.794
Difficulty to speak fluently	<i>r</i>	0.018	-0.133	-0.023	-0.020	0.076	0.097
	Sig.	0.891	0.308	0.858	0.880	0.558	0.455
Difficulty to understand what they listen to	<i>r</i>	-0.059	-0.026	-0.069	-0.087	-0.051	0.005
	Sig.	0.649	0.840	0.596	0.507	0.695	0.972
Difficulty to read medical English vocabulary	<i>r</i>	-0.076	-0.014	-0.074	0.000	0.036	0.006
	Sig.	0.559	0.915	0.570	0.997	0.786	0.963
Difficulty to remember medical English	<i>r</i>	0.082	0.070	-0.015	0.015	0.126	0.169
	Sig.	0.532	0.590	0.906	0.909	0.333	0.192
Difficulty to learn medical English	<i>r</i>	0.026	0.035	0.024	0.062	0.069	0.111
	Sig.	0.842	0.792	0.857	0.637	0.596	0.394

To address the increased risk of errors resulting from the 36 correlation tests performed in Table 4, a Bonferroni correction was applied. The alpha level for significance was adjusted to $p < 0.0014$ ($0.05/36$). Additionally, effect sizes were interpreted using the coefficient of determination (r^2) to assess the practical significance of the relationships.

The data disclose no statistically significant correlations between students' perceptions of AI-based tools and their self-reported linguistic difficulties. After applying the Bonferroni adjustment ($p < 0.0014$), all correlation coefficients remained non-significant. The observed effect sizes were negligible, with r^2 values ranging from 0.0001 to 0.028, suggesting that less than 3% of the variance in linguistic barriers could be explained by attitudes toward AI. While the absence of significant findings suggests a lack of a strong relationship, these results should be interpreted in the context of the study's statistical power; it is possible that the current sample size ($N=70$) was insufficient to detect very weak or subtle associations that might exist in a larger population.

5. Discussion

The findings of this study unveiled that while second-year medical students have a generally positive attitude towards using AI tools for learning medical English vocabulary, these tools do not significantly alleviate the linguistic barriers students face in acquiring and using medical English. This finding is consistent with Tayem et al. (2020), who found that while students appreciated the potential benefits of language support tools, their actual improvement in overcoming barriers, such as writing and speaking difficulties, remained modest. This suggests that the positive attitude towards AI tools observed in our study aligns with their findings, where students' perceptions do not necessarily correlate with improved linguistic competence.

The lack of significant correlations between the use of AI and the reduction of linguistic barriers in this study can be contrasted with Carlson et al. (2022), who examined how AI-based tools influenced students' language learning. While their study found that AI tools helped students improve specific language skills, it also stressed the need for structured integration within the curriculum for these tools to be effective. In a similar vein, the current study's findings indicate that AI tools may have some impact on students' language proficiency, but their effectiveness is contingent on how well these tools are incorporated into a well-rounded, consistent pedagogical approach. In the absence of such integration, AI's role in alleviating linguistic difficulties remains limited.

Moreover, Almushwat and Elkout (2024) pointed out that language barriers in EMI contexts, especially for students transitioning from a non-English-speaking background, remain a significant challenge despite students' positive attitudes towards English as the medium of instruction. This finding mirrors the current study's results, where medical students expressed a willingness to embrace AI tools but continued to struggle with core linguistic issues such as pronunciation, spelling, and vocabulary retention. While

students may recognise the utility of AI in language learning, as found by Hamad et al. (2025), the reality of overcoming language barriers in medical education requires more than positive attitudes; it necessitates systemic changes in how language support tools are integrated into medical curricula.

Interestingly, Hamad et al. (2025) highlighted the complex nature of language barriers in medical education, including the interplay between language proficiency, cognitive load, and the effectiveness of foreign language instruction. They found that language proficiency significantly influenced academic performance and patient communication skills. Similarly, in the present study, students' difficulties with medical English vocabulary, especially productive skills were more apparent. This suggests that while AI tools might help students passively engage with language input, they may not be sufficient to address the active language production demands that medical students face, which require greater linguistic proficiency.

In terms of AI tools' specific benefits, Almushwat & Elkout (2024) pointed out that students preferred bilingual dictionaries and other language support resources to aid their transition to English-medium instruction. This is mirrored by the current study's finding that AI-bilingual dictionaries were viewed positively by students, who regarded them as crucial aids in overcoming language barriers. The reliance on bilingual tools, however, should not be considered as a limitation, but rather as a potential bridge that facilitates lexical transfer and comprehension, especially in contexts like the transition from FMI to EMI.

While the lack of significant correlations between AI tool usage and linguistic improvement may suggest that the current interventions are not yet fully effective, several studies, including Tayem et al. (2020) and Carlson et al. (2022), recommend long-term and structured use of AI tools to foster deeper language learning. The findings of this study suggest that a more deliberate integration of AI tools into the medical curriculum, supported by ongoing training and guided use, could provide more substantial linguistic benefits over time.

In brief, this study contributes to the growing body of research on AI-assisted language learning in medical education, but it also underscores the importance of context and integration when using such tools. While students perceive the potential benefits of AI-based language support, their reported attitudes do not necessarily translate into a perceived reduction in core linguistic obstacles like writing and speaking. While students are open to AI tools, the impact on their linguistic barriers, particularly in productive skills, remains limited. Future research should explore the longitudinal effects of AI-based language interventions and consider integrating these tools into a more cohesive and structured curriculum that addresses the complex nature of language acquisition in medical contexts.

6. Implications

The undertaken study provides valuable theoretical and pedagogical insights into the use of AI tools for learning medical English vocabulary. Theoretically, it contributes to the fields of ESP and EMI/FMI research by unearthing that attitudinal variables alone may have limited explanatory power, especially among novice learners. The absence of significant correlations between students' attitudes towards AI and their reported linguistic difficulties brings to light the need for a more nuanced approach. Factors such as instructional design, learner training, and language proficiency should be considered as mediators of AI's effectiveness. Moreover, the study underscores the importance of contextualising AI integration within local educational realities, particularly in multilingual environments like Algeria, where the use of AI may need to be adapted to the linguistic and cultural context.

Pedagogically, the findings highlight that positive attitudes towards AI alone are not sufficient to overcome the linguistic barriers students tackle, particularly in EMI contexts where cross-linguistic interference from the native language remains significant. While students exhibit enthusiasm for AI tools, especially those offering visual support, interaction, and feedback, these tools should be viewed as supplementary rather than standalone solutions. The integration of AI tools needs to be strategically planned within the curriculum to ensure that they are used effectively and align with specific learning goals.

7. Recommendations

Based on the findings, several recommendations can be made for improving the effectiveness of AI tools in medical English instruction:

1. Integration within Task-Based Frameworks: Medical English instructors should incorporate AI tools into guided, task-based instructional frameworks. Students should be trained to use these tools strategically for vocabulary development, rather than using them in an unstructured or ad-hoc manner.

2. Alignment with Linguistic Objectives: Curriculum developers and syllabus designers should align AI-supported activities with specific linguistic objectives, particularly those targeting pronunciation, academic writing, and medical terminology retention. This ensures that AI tools are used to address the most pertinent linguistic barriers faced by students.

3. Longitudinal and Intervention-Based Research: Future research agenda should adopt longitudinal and intervention-based designs to examine the sustained impact of AI use on linguistic outcomes over time. This would help determine whether structured and consistent use of AI tools can lead to significant improvements in language proficiency.

4. Incorporating Objective Language Measures: In addition to self-reported data, future studies should incorporate objective language proficiency measures. This would provide a more comprehensive understanding of the true pedagogical impact of AI in

medical English learning, offering insights into both the cognitive and behavioural changes brought about by AI tools.

By addressing these recommendations, AI tools can be more effectively integrated into medical English courses, contributing to better language acquisition and helping students overcome linguistic barriers in the EMI context.

8. Conclusion

In conclusion, this study explored the linguistic barriers faced by second-year Algerian medical students in an EMI context and examined their attitudes towards the use of AI in learning medical English vocabulary. While students reported moderate difficulties with medical English, especially in productive skills like pronunciation and writing, they expressed positive attitudes towards AI tools, particularly those offering visual support and feedback. However, the lack of statistically significant correlations between students' attitudes towards AI and their linguistic difficulties suggests that while AI is viewed favourably, its impact on reducing language barriers is not immediate. The findings indicate that AI tools, though beneficial, require structured pedagogical integration and consistent use to effectively address the linguistic challenges in medical education, particularly in the early stages.

The results have significant implications for both teaching practices and theoretical frameworks. They highlight the need for a comprehensive approach that integrates AI tools within well-designed syllabus and developed curricula, ensuring that their use is purposeful and aligned with specific learning outcomes, such as improving pronunciation and writing skills. Furthermore, the study suggests that future research should explore the long-term effects of AI on language acquisition by adopting longitudinal and intervention-based designs, incorporating objective language proficiency measures alongside self-reported data to offer a more holistic view of AI's pedagogical impact.

Declaration of Generative AI Use

The authors, who possess advanced expertise in the English language, utilized Gemini's Model solely for the final-stage refinement of the manuscript. The application of this tool was strictly limited to identifying linguistic redundancies and enhancing stylistic cohesion. All intellectual content, data interpretation, and original drafting were performed exclusively by the authors, who maintain full accountability for the integrity of the final text.

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Schools as Learning Organizations: An Interpretation from the Perspective of Inclusion

Damaris BACIU*

Abstract

The increasing diversity of students' needs challenges schools to respond equitably. Inclusive education is understood not simply as placing students in the same classroom, but as reducing barriers to participation, learning, and belonging. Such a process cannot be achieved through isolated teacher effort alone, but depends on organizational conditions through which inclusion is supported by school vision, leadership, professional collaboration, and collective learning. The school as a learning organization (SLO) provides a relevant framework for examining organizational conditions that may support inclusive education. The study is theoretically grounded in the relationship between the SLO framework and the SEED model, which positions school-level organizational support as a key condition that may contribute to the development of inclusive education. This study examines how specific SLO practices are perceived by teachers and school leaders. It addresses two research questions: (1) Which SLO practices are perceived by teachers and principals as more developed, and which as less developed? and (2) To what extent are there statistically significant differences between teachers' and principals' perceptions of these practices? The study is based on a secondary analysis of a Romanian dataset of 613 respondents, including 70 principals and 543 teachers, using the standardized SLO Questionnaire adapted for the Romanian context. Given the ordinal nature of the data and their deviation from normality, nonparametric analyses were used. Friedman tests with Durbin-Conover post hoc comparisons examined differences among practices within each dimension. Mann-Whitney U tests compared principals' and teachers' perceptions at item level. The findings reveal a consistent pattern: teachers and principals perceive practices as priorities, commitments or general orientations as more developed than practices related to organizational learning mechanisms. Differences between principals and teachers are selective rather than generalized, and are most pronounced in the area of leadership. The findings are discussed in relation to their implications for school organizational conditions that may support inclusive education.

Keywords: schools as learning organizations; inclusive education; organizational practices; teachers' perceptions; principals' perceptions.

* PhD candidate in Education Sciences, West University of Timisoara, University of Turin, e-mail: damaris.pungila98@e-uvvt.ro



Introduction

Increasing diversity of students and of their needs for support and inclusion challenges schools to respond equitably. Inclusive education is understood as a process of reducing barriers to participation and learning, rather than simply placing students in the same educational space, and therefore requires systemic school transformation (Messiou, 2017). Such transformation cannot rely on individual teachers alone, but depends on organizational mechanisms through which new ideas and practices become coherent collective practices (Mincu, 2022). This is particularly relevant in Romania, where teachers generally report positive attitudes towards inclusive education, while also emphasizing the need for training and organizational support (Jurca et al., 2023). International research similarly shows that teachers' attitudes and practices are shaped by school-level support and resources (Avramidis & Norwich, 2002; Supriyanto, 2019), and that training alone is insufficient without ongoing school-based support (Donath et al., 2023).

In this context, the school as a learning organization (SLO) framework is a relevant analytical framework because it describes schools' capacity to learn collectively through shared vision, collaboration, professional learning, and reflection on practice (Sava, 2022) towards the desired aim – in this case, towards ensuring a better inclusion. The model developed by Kools et al. (2020) captures interdependent organizational practices that shape how schools learn, adapt, and improve. Building on the limited Romanian research on SLO, this study extends previous work by Dînşorean and Sava (2023) by focusing on item-level practices. In contrast to the objectives of Dînşorean and Sava (2023), which were to validate the instrument and to describe the SLO dimensions at a general level, the present study has two primary aims. First, it seeks to identify the specific organizational practices within each dimension that are perceived as more or less developed. Second, it aims to examine item level perception gaps between principals and teachers. This approach allows a closer interpretation of the organizational mechanisms that may require further development. It examines which SLO practices are perceived as more or less developed and whether teachers' and principals' perceptions of these practices differ significantly.

Theoretical framework

Inclusive education has been conceptualised in many different ways (Göransson & Nilholm, 2014), ranging from a definition based on physical access to a definition based on participation and belonging (Nilholm & Göransson, 2017; Hernández-Torrano et al., 2022). Establishing a single, universally accepted definition is very difficult (Ainscow, 2020a). This lack of consensus highlights the contextual nature of the term and the importance of studies explicitly specifying their intended meaning (Göransson & Nilholm, 2014). This study conceptualised inclusive education as a systemic and pedagogical approach oriented towards meaningful learning, active participation and belonging for all students, irrespective their special needs for support and inclusion. This definition

supports the idea that inclusive education is an ongoing process of transformation, achieved through the continuous adjustment of practices with a view to reducing barriers to participation, learning and belonging (Ainscow, 2020b).

If inclusion is understood as a process of transformation, then school organization becomes central to translating inclusive intentions into stable practices. Systemic change cannot rely on individual teachers alone; it requires the transformation of the school as an organization, so that new actions, ways of thinking, and behaviours can be consolidated into coherent collective practices (Mincu, 2022). The implementation of inclusive education therefore depends on organizational conditions such as professional collaboration, access to resources and services, time for planning and reflection, and sustained opportunities for professional learning (Ainscow, 2005; Waitoller & Artiles, 2013). Research on professional learning further shows that continuing education is more effective when it is embedded in teachers' daily work and connected to the real needs of the school, rather than delivered as isolated training events (Darling-Hammond et al., 2017; Timperley et al., 2007; Donath et al., 2023). Teachers' attitudes remain important for implementation, as they are associated with willingness to adapt practice and respond to diversity (Florian & Rouse, 2009; Lindner et al., 2023). In Romania, teachers generally report positive attitudes towards inclusion, but these are also linked to the need for training and support (Jurca et al., 2023). International research similarly shows that teachers' attitudes and practices are shaped by school-level resources and support (Avramidis & Norwich, 2002; Supriyanto, 2019).

The SEED model offers an integrative framework for understanding these interdependencies (Struyf et al., 2022). It conceptualizes inclusive education across three levels: the micro level of teacher–student interaction, the meso level of school support through collaboration, leadership, and professional development, and the macro level of policy, rights, and values. From this perspective, school organization functions as a key meso-level condition for inclusion: without support and coordination at school level, inclusive education is unlikely to become sustainable practice. In this context, the school as a learning organization (SLO) provides a useful framework for understanding school-level conditions that may sustain inclusive change. Originating in the broader literature on learning organizations, the SLO concept describes schools as institutions capable of learning collectively, adapting to changing contexts, and improving their practices over time (Kools et al., 2020). The model proposed by Kools and Stoll (2020) is particularly relevant, as it was developed through a critical review of the literature and formulated in action-oriented dimensions such as shared vision, continuous professional learning, collaboration and team learning, inquiry and innovation, knowledge sharing, learning from the external environment, and learning-oriented leadership (Kools & Stoll, 2016; Stoll & Kools, 2017). The relevance of this model for the Romanian context is also supported by its previous adaptation and validation in Romania (Dînşorean & Sava, 2023). The relevance of SLO for inclusive education lies in its focus on collective learning and continuous adaptation. A shared vision can provide direction and coherence for

inclusive values; professional collaboration allows teachers to exchange knowledge and address difficulties collectively; continuous learning supports the refinement of practice; inquiry and reflection help schools identify and revise routines that may generate barriers; and external partnerships extend the resources available for responding to students' needs (Kinsella, 2020; Kools & Stoll, 2016). However, these mechanisms do not function automatically. They must be intentionally supported through decisions, resources, routines, and leadership. Leadership is therefore central in connecting vision with practice, creating the conditions for collaboration, professional learning, participation, and the use of evidence in decision-making (Leithwood & Jantzi, 2006; Leithwood et al., 2020; Stoll & Louis, 2007). In this sense, SEED and SLO are complementary: SEED explains the broader ecological structure of inclusive education, while SLO identifies the organizational mechanisms through which inclusion may emerge, develop, and be sustained at school level. The complementarity between SEED and SLO is based on the premise that SEED identifies the school organization as a fundamental meso-level condition for inclusive education, while the SLO framework outlines the organizational practices through which this condition can be examined empirically. In this study, the SLO is therefore used not as a direct measure of inclusion, but as a framework for analyzing organizational practices that may support inclusive development.

Methodology

The main *objective* of the study is to examine how teachers and school leaders perceive the development of their schools as learning organizations. Specifically, the study employs a *secondary data analysis*, and focuses on item-level data analysis, to identify differences in the perceived development of practices within SLO dimensions and to assess whether statistically significant differences exist between principals' and teachers' perceptions of these practices. The rationale for focusing on item-level analyses was that dimension-level scores may mask meaningful differences among specific organizational practices. A dimension may appear relatively well developed overall, while particular practices within that dimension, such as mentoring, constructive feedback, regular dialogue, use of research, or distributed leadership, may be perceived as less developed.

It should be noted that the study does not directly assess inclusive classroom practices or student outcomes. Rather, it examines organizational conditions that, according to the theoretical framework, may support the development of inclusive education.

The study addresses the following research questions:

1. Which SLO practices are perceived as more developed or less developed?
2. To what extent are there statistically significant differences between the perceptions of principals and the perceptions of teachers regarding the SLO practices?

This study is based on a secondary analysis of the dataset originally collected by Dînşorean & Sava, (2023). The present analyses address distinct research questions and

employ analytical strategies not reported in the original study. More specifically, while previous study focused on SLO dimensions, the present study examines variation among individual practices within each dimension and compares principals' and teachers' perceptions at the level of specific items. This provides additional information about concrete organizational practices, such as mentoring, feedback, knowledge sharing, participation in vision-building, and distributed leadership. Permission to use the dataset for the purposes of the present study was obtained from the authors. While the initial dataset consisted of a *sample* of 650 respondents, 37 individuals belonging to the auxiliary staff category were excluded to allow for a focused comparison between leadership and teaching staff. Consequently, the final sample comprises $N = 613$ respondents, including 70 principals and 543 teachers.

The *instrument* used is the standardized SLO Questionnaire (Kools et al., 2020) adapted for the Romanian context (Dînşorean & Sava, 2023). The instrument is designed to assess perceptions of organizational practices of schools as learning organizations. It comprises 65 items rated on a five-point Likert-scale (1 = strongly disagree to 5 = strongly agree), with higher scores indicating a higher perceived level of development of the respective practices.

The questionnaire is structured around eight dimensions that represent distinct but interrelated domains of organizational practice. An overview of the dimensions and the distribution of items is provided in Table 1 – Structure of the SLO Questionnaire. Each dimension is theoretically relevant for inclusive education, as the dimensions collectively describe meso-level organizational conditions that may support teachers' attitudes towards inclusive education and their interaction with students.

Table 1. Structure of the SLO Questionnaire

<i>Dimension</i>	<i>Focus of practices assessed</i>	<i>Number of items</i>
A	Shared vision centered on student learning	8
B	Involvement of internal and external partners in the school vision	3
C	Opportunities for continuous professional learning	10
D	Team learning and staff collaboration	10
E	Inquiry-, innovation-, and exploration-oriented culture	9
F	Systems for knowledge sharing and use of data	8
G	Learning with and from the external environment	5
H	Leadership practices that support organizational learning	12
Total		65

Evidence from the original instrument development indicates strong internal consistency across all dimensions (Kools et al., 2020). The Romanian adaptation similarly demonstrates high reliability, with Cronbach's alpha coefficients exceeding 0.90 for all eight dimensions (Dînşorean & Sava, 2023).

Data analysis was performed using a statistical processing, conducted using Jamovi (Version 2.7.12). Preliminary analyses of item-level distributions (skewness, kurtosis, and the Shapiro–Wilk test) revealed deviations from normality. Items exhibited negative skewness values ranging from -1.68 to -0.695 and kurtosis values ranging from -0.227 to 2.86 . Additionally, Shapiro–Wilk tests were significant for all items ($W = 0.695\text{--}0.864$, $p < .001$). Given these results and the ordinal nature of the responses (Likert 1–5 scale), nonparametric analyses were conducted (Pereira et al., 2015). For RQ1, differences among items within dimensions were examined using the Friedman test, followed by Durbin–Conover post hoc comparisons for all dimensions. For RQ2, the Mann–Whitney U test was used to analyze item-level differences between principals and teachers.

Results

To address RQ1, Friedman tests were conducted separately for each SLO dimension in order to examine whether statistically significant differences existed among the practices included in the same dimension. All eight tests indicated significant within-dimension differences, suggesting that the SLO practices were not perceived as equally developed: Dimension A, $\chi^2(7, N = 613) = 533.00$, $p < .001$; Dimension B, $\chi^2(2, N = 613) = 7.39$, $p = .025$; Dimension C, $\chi^2(9, N = 613) = 516.00$, $p < .001$; Dimension D, $\chi^2(9, N = 613) = 365.00$, $p < .001$; Dimension E, $\chi^2(8, N = 613) = 273.00$, $p < .001$; Dimension F, $\chi^2(7, N = 613) = 98.00$, $p < .001$; Dimension G, $\chi^2(4, N = 613) = 161.00$, $p < .001$; and Dimension H, $\chi^2(11, N = 613) = 557.00$, $p < .001$.

Durbin–Conover post hoc tests were conducted to determine the relative ranking of practices within each dimension. Table 2 summarises these results by presenting the practices ranked highest and lowest across all dimensions.

Overall, the results show that practices related to formal direction, general commitment, and visible organizational priorities tended to be ranked higher, whereas practices requiring sustained interaction, feedback, mentoring, or distributed participation tended to be ranked lower.

To address RQ2, differences between principals' self-evaluations (Group 1, $n = 70$) and teachers' perceptions (Group 2, $n = 543$) were examined at the item level. For each item, the Mann–Whitney U statistic, associated p value, and rank-biserial correlation were computed as a measure of effect size. Group-level descriptive statistics were examined to support the interpretation of statistically significant results.

Table 2. Highest- and lowest-ranked practices within each SLO dimension

<i>Dimension</i>	<i>Rank position</i>	<i>Item</i>	<i>Item content</i>	<i>Mean rank</i>
A	Highest	O_A_3	The school's vision considers all students.	5.219
A	Lowest	O_A_7	All staff members are involved in developing the school's vision.	3.546
B	Highest	O_B_1	Students are invited to contribute to the school's vision.	2.033
B	Lowest	O_B_2	Parents are invited to contribute to the school's vision.	1.959
C	Highest	O_C_1	Professional learning for staff is a high priority.	6.595
C	Lowest	O_C_6	Mentors/coaches are available to help staff improve their practice.	4.418
D	Highest	O_D_7	Staff treat one another with respect.	6.488
D	Lowest	O_D_4	Staff provide one another with honest feedback.	4.926
E	Highest	O_E_1	Staff members are encouraged to experiment and innovate their practice.	5.659
E	Lowest	O_E_7	Staff members are open to others challenging their beliefs, opinions, and ideas.	4.336
F	Highest	O_F_1	The school development plan is based on learning from ongoing self-evaluation and is updated at least annually.	4.925
F	Lowest	O_F_2	Structures (systems) are in place for regular dialogue and knowledge sharing among staff members.	4.234
G	Highest	O_G_5	The school as a whole is involved in networks or collaborations that include other schools.	3.316
G	Lowest	O_G_2	Staff actively collaborate with higher education institutions to deepen staff and students' learning.	2.649
H	Highest	O_H_1	The principal(s) participate in professional learning to improve their practice.	7.144
H	Lowest	O_H_4	The principal(s) develop others' potential to become future leaders.	5.383

For Dimensions A–G, statistically significant differences were selective rather than generalized, as shown in Table 3. Significant differences were found in Dimension A for four items related to the school vision and its orientation toward student learning ($p = .032$ to $.002$; $r = -.14$ to $-.21$), in Dimension B for one item referring to parents' contribution to the school vision ($p = .032$; $r = -.14$), in Dimension C for one item concerning the priority given to professional learning ($p = .001$; $r = -.22$), in Dimension E for three items related to innovation and inquiry ($p = .014$ to $< .001$; $r = -.16$ to $-.24$), and in Dimension F for two items concerning self-evaluation and structures for dialogue and knowledge sharing ($p = .002$ to $.003$; $r = -.20$ to $-.21$), while no statistically significant

differences were detected in Dimensions D and G. Across all significant items, principals consistently rated the practices more positively than teachers.

Although statistically significant, the effect sizes in Dimensions A–G were small to small-moderate, suggesting that the differences between principals and teachers should be interpreted cautiously. These results indicate perceptual gaps rather than strong group separation.

Table 3. Mann–Whitney U test results for significant items in Dimensions A–G

<i>Dim.</i>	<i>Item</i>	<i>U</i>	<i>p</i>	<i>r (rank-biserial)</i>	<i>Principals M (Median)</i>	<i>Teachers M (Median)</i>
A	O_A_1	16343	.032	–.140	4.54 (5)	4.39 (5)
A	O_A_2	15029	.002	–.209	4.54 (5)	4.26 (4)
A	O_A_3	15802	.009	–.169	4.66 (5)	4.38 (5)
A	O_A_5	15498	.008	–.185	4.31 (4)	3.98 (4)
B	O_B_2	16260	.032	–.144	4.24 (4)	4.02 (4)
C	O_C_1	14911	.001	–.215	4.59 (5)	4.23 (4)
E	O_E_1	15876	.014	–.165	4.39 (4)	4.10 (4)
E	O_E_2	14925	.001	–.215	4.44 (4)	4.09 (4)
E	O_E_3	14431	<.001	–.241	4.33 (4)	3.92 (4)
F	O_F_1	14975	.002	–.212	4.41 (5)	4.08 (4)
F	O_F_2	15200	.003	–.200	4.21 (4)	3.88 (4)

The most pronounced pattern of group differences was observed in Dimension H, where statistically significant differences were observed for all items ($p \leq .007$), as shown in Table 4. Effect sizes ranged from moderate to large, with rank-biserial correlations between $r = -.18$ and $r = -.35$. The largest effect was observed for the practice referring to principals' role in developing others' potential to become future leaders ($r = -.35$), indicating a substantial divergence between principals' and teachers' perceptions. Across this dimension, principals consistently ranked these items higher than teachers.

Table 4. Mann–Whitney U test results for significant items in Dimensions H

<i>Item</i>	<i>U</i>	<i>p</i>	<i>r (rank-biserial)</i>	<i>Principals M (Median)</i>	<i>Teachers M (Median)</i>
O_H_1	14907	.001	–.22	4.67 (5)	4.36 (4)
O_H_2	14602	<.001	–.23	4.63 (5)	4.28 (4)
O_H_3	14231	<.001	–.25	4.69 (5)	4.29 (4)
O_H_4	12272	<.001	–.35	4.59 (5)	3.94 (4)
O_H_5	12955	<.001	–.32	4.63 (5)	4.12 (4)
O_H_6	14377	<.001	–.24	4.41 (4)	3.98 (4)
O_H_7	14830	<.001	–.22	4.66 (5)	4.35 (4)
O_H_8	14253	<.001	–.25	4.60 (5)	4.17 (4)
O_H_9	13620	<.001	–.28	4.71 (5)	4.29 (4)

<i>Item</i>	<i>U</i>	<i>p</i>	<i>r (rank-biserial)</i>	<i>Principals M (Median)</i>	<i>Teachers M (Median)</i>
O_H_10	13945	<.001	-.27	4.67 (5)	4.29 (4)
O_H_11	15350	.004	-.19	4.47 (4)	4.15 (4)
O_H_12	15586	.007	-.18	4.61 (5)	4.33 (4)

Overall, the results indicate that differences between principals' and teachers' perceptions are selective rather than generalized. While most organizational practices are perceived similarly by both groups, systematic divergences emerge for specific practices—particularly those related to leadership. The largest effect size was observed for the practice referring to principals' role in developing others' potential to become future leaders. This suggests that principals perceive leadership capacity-building and distributed leadership as more developed than teachers do, indicating a possible gap between leadership intentions and how these opportunities are experienced by staff in everyday school practice.

Discussion

The objective of the present study was to examine the extent to which learning organization practices are perceived as developed by teachers and principals in Romanian schools. This investigation does not evaluate the implementation of inclusive education directly, but examines whether teachers and principals perceive the presence of organizational conditions that may support inclusion development.

Regarding the first research question of the study, the results outline a relatively stable pattern across the dimensions analyzed: practices that can be formulated as commitments, guidelines, or priority statements are perceived as better developed, while practices describing recurrent mechanisms of organizational learning (support in practice, regular dialogue, feedback, use of research, internal capacity development) are perceived as less developed. This pattern is supported by the organizational learning literature, which highlights that although learning is often recognized as important in schools, it remains difficult to translate into concrete and sustained procedures in everyday work (Schechter et al., 2022).

One possible explanation is that schools have begun the process of transforming themselves into learning organizations by adopting an explicit direction and priorities, but the mechanisms that enable learning to occur on a regular basis are still in the process of being consolidated. In operational terms, learning mechanisms can be understood as institutionalized arrangements through which the school collects, distributes, interprets, stores, and retrieves information relevant to teaching and the performance of the school system; without these arrangements, learning remains rather individual and fragmented (Schechter et al., 2022). In this sense, the results suggest that without a good consolidation of these mechanisms, inclusive education may risk remaining at the level of intention, as it is limited by the infrastructure through which support for teachers becomes constant in daily practice.

In terms of vision, the results suggest that the participatory process of vision building is perceived as being less developed (involvement of teachers and parents). This result may indicate that the vision functions more as a formal benchmark than as an ongoing process of negotiation and guidance for daily decisions. The literature on "shared vision" emphasizes that vision becomes functional when it is co-constructed and periodically revisited within the school community, not just communicated as a statement (Toikka & Tarnanen, 2024; Kools & Stoll, 2016). Consequently, a vision oriented toward inclusion that is not maintained through participation may have less influence on everyday school practices.

With regard to continuous learning, a similar difference can be observed between orientation and support: priority given to professional development is ranked high, while the availability of mentors/coaching and regular feedback is ranked low. This result is consistent with the idea that schools can promote training as a value, but have fewer mechanisms through which learning is integrated into daily practice. Recent Romanian literature on SLO consistently emphasizes that the existence of training opportunities is not sufficient in itself, and that the interpretation of results must distinguish between the presence of a training framework and its quality/integration into the professional routine of staff (Rădulicea & Sava, 2025). The literature on professional development emphasizes that participation in training may be insufficient for stable change if it is not complemented by practical support, such as mentoring, coaching, and feedback (Donath et al., 2023). Such support can help teachers translate principles into teaching decisions, observe their effects, and adjust interventions over time (Darling-Hammond et al., 2017; Timperley, 2011). For inclusive education, this area may be important because inclusion involves a continuous process of identifying and reducing barriers to learning, which requires support for diagnosis, adaptation, and fine-tuning of practice (Waitoller & Artiles, 2013). Without solid support, there is a risk that inclusive practices will depend on individual initiative and that teachers will feel unsupported in implementing inclusive practices.

The results regarding collaboration and innovation complete the picture with the same nuances. On the one hand, there is general collaboration and a respectful collegial climate; on the other hand, the comfort of asking for advice and giving/receiving direct feedback is less perceived. This may suggest that there are functional relationships, but collaboration is not fully institutionalized in stable routines that support deep professional learning. Similarly, teachers are encouraged to take initiative and experiment, but open discussion of failures and openness to challenging ideas appear to be less developed. One possible interpretation is that there is a focus on improvement, but the conditions necessary for consistent feedback and learning from difficulties are not sufficiently established. For inclusion, this may be important because adapting teaching for vulnerable students involves trial and error, and learning from what does not work becomes a component of progress, not an individual failure (Donath et al., 2023).

With regard to knowledge and learning exchange systems, the results suggest that self-evaluation and planning are perceived as being better implemented than the use of research to improve practice and the existence of structures for regular dialogue between teachers. This contrast is relevant for SLO because planning and self-evaluation produce educational value when they are connected to regular conversations about teaching and to the shared interpretation of evidence (Kools & Stoll, 2016). A related finding that may help explain the weaker use of research is that partnerships with universities are perceived as less developed than partnerships with other schools. In the absence of sustained collaborations with academia, schools may have fewer opportunities to access research and guidance for translating research into teaching; thus, the use of research may remain peripheral, even if planning and self-evaluation exist.

In the area of leadership, the lowest-rated practice is developing the potential of others to become leaders, and this coincides with the greatest difference in perception between teachers and principals. In this sense, weaker development of this aspect may contribute to maintaining some practices at a rather declarative level, without consistent routines to support learning in practice. At the same time, this result may indicate a possible direction for further organizational development. Rather than demonstrating a specific stage of development, the findings suggest that leadership practices could be further oriented toward distributed participation (Leithwood et al., 2020).

Regarding the second question of the study, the results indicated that the most significant discrepancies between teachers and principals were identified in the area of leadership. Similarly, the study conducted by (Dînşorean & Sava, 2023) identifies discrepancies between teachers and principals in the areas of leadership and vision. This result is relevant because leadership is often described as a central factor for school transformation, through its role in creating conditions, allocating time, and establishing routines for collaboration and collective learning (Leithwood et al., 2020; Mincu, 2022). The differences in perception can be interpreted as a sign that leadership intentions and actions are not always experienced similarly in teachers' daily lives. In other words, the school may have elements of direction and organization that are reported more positively by principals, but teachers perceive less real access to support and opportunities, which may limit the consolidation of SLO mechanisms.

A similar pattern can be observed in relation to significant differences found in other dimensions, where principals also tended to rate school practices more positively than teachers. These practices concern, for example, the extent to which teachers are encouraged to innovate, participate in shaping the school vision, or benefit from regular structures for professional dialogue. Taken together, these results suggest that the differences between teachers and principals are not generalized across all SLO practices, with the most substantial divergences emerging in the area of leadership.

Limitations

The interpretation of the results must take into account several limitations. First, the data are perceptual and based on self-reporting, which means that they reflect participants' subjective assessments of SLO practices rather than direct observations of implementation. Therefore, response biases or differences in item interpretation may have influenced the results. Second, the imbalance between group sizes (principals $n = 70$, teachers $n = 543$) may affect the sensitivity of the Mann–Whitney U test and the interpretation of group differences. The unequal group sizes have no effect on effect size estimates, but they may reduce their stability and precision, particularly because the principals' group is much smaller. Finally, although the study is relevant to inclusive education, it does not directly measure inclusive classroom practices or student outcomes. Thus, the link between perceived SLO practices and inclusion remains interpretative and theoretically supported, but not empirically confirmed in this design.

Conclusion

In conclusion, the findings suggest that Romanian schools display several practices of learning organizations, particularly in terms of shared priorities, commitment to professional learning, and general openness to improvement. However, the least developed practices are those that sustain organizational learning in everyday school life: mentoring and coaching, regular professional dialogue, constructive feedback, the use of research, and the development of distributed leadership. From the perspective of organizational conditions relevant to inclusive education, this indicates that schools may not be limited primarily by a lack of inclusive intention, but by the still-fragile organizational mechanisms needed to translate such intentions into consistent and sustainable practice. At the same time, because the study examines perceived organizational conditions rather than inclusive classroom practices or student outcomes, the findings should be understood as evidence of schools' organizational readiness to support inclusion, not as direct evidence of inclusive practice implementation.

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Declaration on the use of artificial intelligence (AI) tools

During the preparation of this manuscript, artificial intelligence tools were used to support the writing and revision process. ChatGPT was used for brainstorming ideas related to the theoretical framework, for methodological guidance, and for support in identifying the concrete steps required to conduct the statistical analyses in Jamovi. It was also used to refine some sections of the text and to improve the overall coherence,

clarity, and logical structure of the manuscript. DeepL Translate and DeepL Write were used to improve the quality, fluency, and academic style of the English writing. All AI suggestions were critically reviewed, edited, and verified by the author, who remains fully responsible for the content, accuracy, interpretation of results, and final version of the manuscript.

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An Analysis of Bullying among Students

Ovidiu LICĂ*, Atalia ONIȚIU**

Abstract

This paper explores the phenomenon of bullying among students in Romanian schools through a cross-sectional, descriptive design, aiming to understand forms, frequency, causes, consequences of bullying, and the ways students and teachers respond to such incidents. The research is grounded in the socio-ecological theory and the growing concern over the emotional and psychological impact bullying has on school-aged children. The methodological approach consisted of a questionnaire developed by the authors and applied to a sample of 103 participants, including students from various school levels. Results indicated that bullying is a prevalent issue in Romanian schools, with verbal and physical bullying being the most commonly reported forms. Teacher reactions were mixed, while some responded by addressing the conflict, others showed indifference or failed to act. In some cases, respondents believed that the type of bullying or the victim's gender could influence the reaction of school staff, although statistical significance was not always clear. The findings confirmed that bullying can have serious emotional and psychological long term consequences over the victims. Individual characteristics (gender, education level) and contextual factors (field of study, place of residence) were not confirmed in our study as significant influences on respondents' experiences with bullying; these results may be attributable to sample size or the specific Romanian context. Further analysis is recommended to gain a deeper understanding of the influencing factors and the mechanisms underlying the phenomenon of bullying.

Keywords: bullying; educational environment; aggression; violence; students; social relationships.

* MA student, Faculty of Sociology and Social Work, West University of Timisoara, Romania, ovidiu.lica02@e-uvt.ro

** Lecturer, PhD, Department of Sociology, Faculty of Sociology and Social Work, West University of Timisoara, Romania, atalia.onitiu@e-uvt.ro



Introduction

Bullying is a social phenomenon that has been present throughout human history, manifesting itself in various forms in different contexts. Although the concept has been defined and studied systematically only in recent decades, aggressive behaviors based on intimidation, humiliation, and abuse of power have existed in societies since ancient times. In the past, these behaviors were often viewed as part of natural social hierarchies or as methods of strengthening character, being tolerated or even encouraged in certain environments (Olweus, 1993). However, modern research has demonstrated the negative impact of bullying on the individual and on society, which has led to increased interest in preventing and combating it (Moore et al., 2017; Gaffney, Ttofi & Farrington, 2019).

Bullying is aggressive behavior, repeated over time, characterized by an imbalance of power between the aggressor and the victim. It is not a simple conflict between individuals, but a type of systematic aggression, with significant consequences on the mental and emotional health of the victims (Olweus, 1978). Bullying is not limited to physical aggression, but also includes subtle forms such as insults, social manipulation and psychological intimidation. It is not just an individual problem, but a systemic one, influenced by social norms and values (Olweus, 1993).

Today, bullying is recognized as a global problem that requires effective prevention and intervention measures. International organizations such as the World Health Organization (WHO), the United Nations (UN) and UNICEF have developed programs and guidelines to combat bullying, emphasizing the importance of awareness and education in its prevention (UNESCO, 2019; WHO & UNESCO, 2019).

The evolution of the perception of bullying reflects a major change in society. If in the past such behaviors were considered natural or inevitable, today they are recognized as a serious problem that can have negative consequences on the health and well-being of individuals (Moore et al., 2017; Gaffney, Ttofi & Farrington, 2019). Research conducted in recent decades and the development of evidence-based prevention programs have contributed to increasing awareness and developing strategies aimed at combating bullying in all its forms (Olweus, 1993; Gaffney, Ttofi, & Farrington, 2019; Gaffney, Ttofi, & Farrington, 2021).

Theoretical framework

Olweus (1993) defined bullying as intentional, negative, repetitive behavior directed at a person who cannot easily defend himself, emphasizing essential elements such as the intention to cause harm, repetitiveness and an imbalance of power. Lagerspetz, Bjorkqvist and Pelton (1988) consider that an isolated incident can represent bullying behavior when the victim has feelings of humiliation and fear for a long period after the incident.

Bullying can also be analyzed from the perspective of an imbalance of power. Olweus (1993) emphasizes that the term bullying cannot be applied when two individuals with

the same influence and strength come into conflict. It is essential to understand that, in childhood, competitive or conflict-like interactions are common and, often, are part of a social “game” that helps develop relationship skills and release energy. The fundamental difference lies in the emotional reactions of the participants. For example, in playful social interactions, the relationships between the participants remain intact, and the behavior has no negative consequences for them.

To recognize a behavior as bullying, it is essential to identify the aggressor’s intention to cause physical or psychological harm to the victim. Thus, two fundamental criteria underlie the definition and identification of bullying: the repetitiveness of the actions and the imbalance of power between the aggressor and the victim. A flexible approach, which takes into account the specific circumstances and the impact on the affected person, is essential for the correct understanding of bullying and for the development of effective prevention and intervention strategies (Eleni, 2014).

Bullying can be simply described as negative and intentional behavior, which is repeated and is directed against a person who cannot easily defend himself. This definition shows that bullying has three main features: it is aggressive and intends to harm the targeted person; it is repeated over time; it is not an isolated incident and imposes an imbalance of power, whether real or perceived, between the aggressor and the victim (Olweus, 2010).

Bullying has devastating effects on both victims and aggressors, causing profound psychological, social and behavioral problems. Victims are often affected by anxiety, low self-esteem, loneliness and difficulties in developing social skills, which can lead to depression and serious psychosomatic manifestations. Social stigmatization and feelings of isolation are associated with increased risk of running away from home, alcohol or drug use, and in severe cases, suicide (Moore et al., 2017; Cuesta et al., 2021; Wilson et al., 2023). Educationally, bullying reduces school performance and intensifies feelings of insecurity. Aggressors, on the other hand, also face long-term negative effects, manifesting destructive behavior, including involvement in arguments, vandalism, substance use, theft and absenteeism. In some situations, they resort to the use of weapons, and their violence can escalate to serious acts, such as murder (Nakamoto & Schwartz, 2010; Ttofi et al., 2012). Thus, bullying deeply affects both parties involved, leading to emotional and social imbalances that are difficult to correct (Turchina, 2011).

Bullying worries both parents, children, and teachers. Managing this phenomenon is important for the learning process to function well. Aggressive behaviors and situations in which some children are victims strongly affect the lives of children and adolescents (Micle et al., 2020).

The school environment plays an important role in the social, intellectual and emotional formation of children, but unfortunately, it can also become a place where bullying behaviors are frequently encountered (UNESCO, 2019). This phenomenon has complex effects on all those involved – victims, aggressors, witnesses – and also influences the entire educational community. Bullying can have negative consequences

on the emotional and psychological state of students, while also affecting their academic performance and deteriorating interpersonal relationships, as well as the general atmosphere in the educational environment (Moore et al., 2017; Nakamoto & Schwartz, 2010).

Bullying is more frequently analyzed in the school context, but relatively limited attention has been paid on the influence of school factors on victimization among peers (Saarento, Boulton & Salmivalli, 2015). Various factors (school size; environment (urban or rural); level of teacher training; disciplinary strategies applied; proportion of students belonging to ethnic minorities) can determine such behaviors in schools, and it is very important that they are correctly identified in order to be correctly prevented (Olweus, 1993).

When students perceive school as an environment where they do not receive acceptance, support, respect, or fair treatment, the incidence of bullying increases significantly (Juvonen & Graham, 2014).

A study by Zequinão et al. (2016) highlights the problem of bullying in areas with high social vulnerability. The research, which involved 409 students aged 8 to 16, showed that almost 30% of boys and over 40% of girls had been victims of bullying, and approximately 32% of boys and 25% of girls admitted to having engaged in bullying behavior. The results show that verbal aggression is the most common, being more frequent among girls, while boys tend to be more involved in physical aggression. Bullying most often occurs in classrooms, during breaks and during physical education classes, which highlights the need for better supervision in these places. Girls also reported more often feelings of loneliness and exclusion, while boys showed more confident and aggressive behavior. Importantly, victims were more willing to offer help to peers who are being bullied, even if they do not know them, while aggressors were less inclined to support someone. At the same time, the study revealed low involvement from teachers and school staff, with half of the students reporting that they do not intervene or do so very rarely. This lack of intervention contributes to the perpetuation of the problem and highlights the need for better training of staff and a closer relationship between school and students.

According to UNICEF (2014), almost one in three students aged 13 to 15 reported having been involved in a fight in the past year. At the same time, over a third of students in the same age group reported being bullied frequently. In Europe and North America, approximately one in three adolescents aged 11 to 15 admitted to having bullied or harassed someone at school at least once in the past two months (Abu-Ria, 2016). Krug et al. (2002) showed that the majority of 13-year-olds in 27 countries had been involved in bullying behavior at least once. Nansel et al. (2004), analyzing bullying in 25 countries, including USA and Canada, found that bullying involvement varied between 9% and 15%, with an average of 11%. In some countries, such as Sweden, only 5% of children have been victims, while in Lithuania the percentage reaches 20%. In Ontario, a study

indicated that about one in three students (29%) reported being bullied at school (Chirev, 2014).

In OECD countries, 11% of students are frequently teased, 7% are socially excluded, and 8% are the target of defamatory rumors. Although all forms of bullying are common, physical aggression is the most common, perceived by teachers as more serious than verbal or relational aggression. On average, boys are more likely than girls to be victims of bullying, with the exception of social isolation and the spread of gossip (INSP, 2018).

Therefore, bullying is not only an individual problem, but also one influenced by social, economic and environmental factors. According to studies, bullying is a problem that affects many students, regardless of their background. A large number of children are either victims or aggressors, with clear differences between boys and girls, but also between the regions where it occurs. The lack of involvement of school staff exacerbates the situation, as they should identify and stop the phenomenon, but most of the time this does not happen. Preventing this phenomenon requires integrated measures, including better education, social support policies and coordinated interventions, to create a safe and friendly school environment for all students (Zequinão, 2016).

In Romania, the phenomenon of bullying in schools has only been superficially analyzed, without extensive studies exploring it in detail. Most research has focused on school violence as a whole (UNICEF, 2006). Although it is known that bullying has a negative impact on the emotional and psychological health of children, there is very little research examining the extent to which social support, especially that from the family, can contribute to reducing these effects. Therefore, it is essential that prevention and intervention against bullying become a priority, especially given that effective solutions in this area have not yet been sufficiently well researched (Ciucă, 2019).

Almost half of students have been victims of bullying, and most of them have seen such behaviors at school. The most common forms of bullying are verbal, followed by social exclusion and physical violence (World Vision Romania, 2021). In 2023, almost half of students (49%) were victims of bullying, and approximately 81% witnessed such incidents. These statistics highlight the need to implement more effective programs to prevent and combat bullying in schools (Save the Children Romania, 2023).

The novelty of the present study lies in its broader approach to the phenomenon of bullying in Romanian schools. While reports published by UNICEF, World Vision Romania (2021), Save the Children Romania (2023) have primarily focused on the prevalence of bullying and its main forms of manifestation, the present research simultaneously examines multiple dimensions of the phenomenon. In addition to identifying the different forms of bullying, this study investigates victims' experiences, bystanders' reactions, teachers' responses, and the psychological consequences that bullying may have on students. Furthermore, the research tests a series of statistical hypotheses regarding the relationship between bullying and variables such as gender, place of residence, educational level, and high school specialization. Through this comprehensive approach,

the study complements existing research and provides a more detailed understanding of how bullying is perceived and experienced in the Romanian school environment.

From a theoretical standpoint, our article is grounded in the socio-ecological model (Espelage, 2014; Swearer Napolitano & Espelage, 2011), which posits that bullying results from the interaction between individual characteristics (gender, education level, place of residence), interpersonal relationships (with peers and teachers), school environment factors, and the broader social context. Bullying is not merely a personal experience but a social phenomenon shaped by a multitude of contributing factors.

Methodology

The aim of the present study is to analyze the phenomenon of bullying in Romanian schools. For this purpose, we opted for a quantitative, cross-sectional, descriptive design, guided by the following objectives:

Ob.1. To analyze the differences in prevalence and forms of bullying victimization in Romanian schools according to students' socio-demographic and educational characteristics.

Ob.2. To examine whether students' and teachers' responses to bullying incidents differ according to gender, the type of bullying, and victim characteristics.

Ob.3. To investigate the consequences of bullying on students

In direct relation to these objectives, we formulated the following research hypotheses:

H.1. There are statistical differences in the phenomenon of bullying depending on the area of residence and the level of education.

H.2. Girls experience a higher level of bullying than boys.

H.3. There is a statistical association between the specialization followed and the level of bullying experienced.

H.4. Verbal bullying is more present than physical bullying.

H.5. There is a statistical association between the gender of the respondent and the form of bullying experienced.

H.6. The main form of reaction of witnesses to bullying is indifference.

H.7. There are statistical differences in the way of reacting to bullying depending on the gender of the respondent.

H.8. There are statistical differences in the way teachers react depending on the type of bullying and the gender of the victim

H.9. Experiencing bullying has long-term consequences on the mental health of victims.

Based on the objectives and hypotheses formulated in this research, a questionnaire consisting of 26 questions was developed. 20 questions with multiple-choice or 5-point Likert scale responses aimed to analyze the presence of bullying in schools (forms, frequency, role of respondents (victim/aggressor), consequences, reactions,

management methods); the last six questions collected socio-demographic data of the respondents (ANNEX 1).

Although the literature includes several validated instruments for measuring bullying, these tools were developed for different research purposes and primarily focus on assessing the frequency of victimization and aggressive behaviors. The objectives of the present study were broader, aiming not only to identify the forms of bullying but also to examine bystanders' reactions, teachers' responses, students' perceptions of how teachers manage bullying situations, and the psychological consequences of bullying. For this reason, a self-developed questionnaire was designed specifically for the purposes of this study, ensuring that each research objective was addressed through specific items.

Data collection was carried out by applying the questionnaire online (Facebook, WhatsApp, email) over a period of approximately four weeks, between February and March 2025. Participants were informed about the confidentiality of their responses and their use exclusively for the academic purpose of the study.

Population

Considering that a study on minors presents a series of difficulties, including emotional ones, given the subject of our research, we opted for a study on adults. The target group was represented by people aged between 18 and 30, given that in these age ranges we could find both individuals who are still in high school and those who have already entered the university. Being relatively close to their school experiences, respondents will have a fresh memory and a clear perception of the bullying phenomenon, which will allow them to answer the questions accurately. For this research approach, we used a random, non-probabilistic sampling method (the "snowball" method). 103 responses were collected. Most of the respondents are young, in their first years after graduating from high school or during their university studies. Therefore, it is possible that their interest in completing the questionnaire is related to previous experiences during high school, when the phenomenon of bullying is more common. The gender distribution is balanced. Regarding the area of residence, most of the subjects come from urban areas (see **Table 1**).

Table 1. Socio-demographic characteristics of the participants

Age	62,1% - 18-25 years
	37,9% - 25-30 years
Sex	50,5% - Male
	49,5% - Female
Residence	74,8% - Urban
environment	25,2% - Rural
Education level	56.3% - University
	25.2% - Post-

	university
	18.4% - High school
Graduated high-school	73.8% - Theoretical
	26.2% -
	Technological

Results

The first objective of our research aimed to analyze the differences in prevalence and forms of bullying victimization in Romanian schools according to students' socio-demographic and educational characteristics. The majority of respondents, almost 70%, stated that they observed bullying in school to a great or very great extent, which indicates a high and visible presence of the phenomenon in the educational environment. Over half of the respondents (52.4%) indicated that bullying occurs weekly, and 24.3% reported a daily frequency. This suggests that, in the perception of students, bullying is a frequently encountered phenomenon in the school environment. A smaller percentage (10.7%) mentioned that bullying occurs monthly. Regarding the frequency of bullying, 61.2% of those surveyed answered that bullying happened often or very often, 27.2% answered that it happened occasionally, and the remaining 11.6% said that bullying happened rarely or very rarely. These results show us that bullying happens quite often in schools.

Approximately 47.5% of respondents stated that they had been victims of bullying to a medium, high or very high extent, which suggests that almost half of the participants had faced this phenomenon to a significant extent. The remaining 52.5% stated that they had been affected to a lesser extent.

37.8% of the participants carried out bullying activities at least to a small extent. In other words, approximately one third of the people who participated in the research were, at least once, in the position of aggressor.

In direct connection with the first research objective, we have formulated the first research hypothesis (there are statistical differences in the phenomenon of bullying depending on the area of residence and the level of education). To verify the validity of our assumption, we used an independent sample T-test (Figure 1). The test results showed that the difference between the groups according to area of residence (urban vs rural) is not statistically significant, $t(101)=1.21$, $p=.229$. Although the average of reported forms of bullying is slightly higher in urban areas ($M=2.32$, $SD=.99$) compared to rural areas ($M=2.04$, $SD=1.18$), this difference is not large enough to be considered statistically significant. Therefore, it can be said that the area of residence does not significantly influence the perception of the forms of bullying experienced personally.

In what concerns the level of education (high school vs. university), the results (Figure 2) showed that there is no statistically significant difference between the two groups, $t(75)=-1.28$, $p=.206$. The mean of the responses is lower among respondents from

high school ($M=1.79$, $SD=1.08$), compared to those from university ($M=2.14$, $SD=1.02$), which indicates a tendency for students to have encountered forms of bullying more frequently. However, this difference is not large enough to be considered statistically significant. Therefore, the level of education does not significantly influence the perception of forms of bullying personally experienced.

Also in relation to the first objective of the research, the hypothesis 2 (girls experience a higher level of bullying than boys) was formulated. We conducted two T-tests: the first T-test is between the gender variable and the question "To what extent have you been a victim of bullying during school?" (Figure 3), and the next T-test is between gender and the question "How do you rate the severity of the acts of physical bullying you have encountered?" (Figure 4). None of the results revealed significant differences between the answers provided by the respondents ($t(101)=0.76$, $p=.447$, respectively $t(101)=-0.18$, $p=.858$).

To test whether there is a statistical association between the specialization followed during high school and the level of bullying experienced (H.3.), we resorted to a correlation analysis (Figure 5). However, this revealed a very weak and statistically insignificant positive correlation between the two variables ($r(103)=.089$, $p=.372$). We also conducted a Pearson correlation to examine the relationship between the profile of the high school attended and the degree to which participants reported being victims of bullying during school (Figure 6). The results also indicated a very weak and statistically insignificant correlation ($r(103)=.041$, $p=.681$).

Regarding our hypothesis referring to the forms of bullying (H.4. Verbal bullying is more present than physical bullying), out of the total of 103 respondents, almost half (49.5%) stated that they had been exposed to both verbal and physical bullying. This is the most frequently reported combination, suggesting that in many cases bullying does not manifest itself in a single form, but through a mixture of physical and verbal abuse. In second place in frequency is verbal bullying, experienced by 37.9%. This indicates that verbal aggression is a very common form of bullying in schools. Only a small percentage (5-6%) reported only physical bullying, and another similar percentage stated that they had not encountered any form of bullying, therefore our research hypothesis is invalidated.

The second objective of our research aimed to examine whether students' and teachers' responses to bullying incidents differ according to gender, the type of bullying, and victim characteristics. In terms of the forms of verbal bullying encountered, the majority of respondents indicated that they were exposed to insults (72.8%). This is the most common type of verbal bullying reported, followed by negative or humiliating nicknames (67%). Degrading comments about physical appearance were also reported by a significant number of respondents (55.3%), and sexist comments were experienced by almost 40% of participants. Less frequently mentioned forms were inappropriate jokes and comments about clothes, each reported by only one respondent (1%). These

results show that the most common forms of verbal bullying are direct and visible ones, such as insults, nicknames and comments about appearance.

Concerning the presence of physical bullying in schools, most responses focused on the area of high perception of the phenomenon. 35.9% of respondents indicated that they observed physical bullying to a great extent, and 25.2% stated that they observed it to a medium extent. A smaller percentage (14.6%) mentioned a very great extent, indicating that some respondents consider physical bullying to be a serious and frequent problem.

The most frequently reported forms of physical bullying behaviors were pushing (67%) and hitting (49.5%). These results show that direct and obvious forms of physical aggression are the most common in the school environment. The use of objects for hitting was mentioned by 25.2%, indicating a more serious and dangerous form of bullying.

Regarding the forms of bullying, we found it relevant to investigate whether there is a statistical association between the gender of the respondent and the form of bullying experienced (H.5.). For this, we performed a Pearson correlation analysis that indicated a weak and statistically insignificant negative correlation, $r(103) = -0.184$, $p = .062$ (Figure 7).

Students' reactions to bullying are diverse. Most of the respondents said that they tried to help the victim (46.6%). Also, 15.5% said that they actively intervened to stop the bullying. These answers show that many students choose to get involved and not remain indifferent when they see a bullying situation. On the other hand, 23.3% said that they were only witnesses, that is, they saw what was happening, but did not intervene. Only one person said that they were most often the victim, which shows a different personal experience. As we can see, most students react positively when they see bullying, either helping the victim or intervening. However, there is also a fairly large number of students who choose not to get directly involved.

Regarding the reaction of peers to an act of bullying, the largest number of respondents (37.9%) said that their peers laughed and encouraged the aggressors, which means that many students choose to do nothing, but worryingly encourage bullying behaviors. 22.3% said that some peers tried to help the victim, showing empathy and a desire to help. Another group, of 15.5%, said that they had peers who actively intervened to stop the bullying. A smaller number (8.7%), said that they saw peers who alerted a teacher, which shows a positive thing, but unfortunately these cases are very few in number. One person said that a peer noticed the situation but did not intervene. Our hypothesis (H.6.) that "The main form of reaction of witnesses to bullying is indifference" is therefore not validated, since the majority of 46.6% of respondents answered that they intervened trying to help the victim.

To verify whether the reaction of witnesses to bullying is influenced by their gender (H.7.), we used two T-tests on independent samples, between the gender variable and the two situations - the witness and his colleagues. For the situation in which a person witnessed an act of bullying, the results show that there is no statistically significant difference between the two groups. Boys had an average of 1.76 (with a standard

deviation of 0.91), and girls an average of 1.80 (standard deviation of 0.94). The difference between these averages is very small and is not statistically significant: $t = -0,228$, $p = 0,820$ (Figure 8).

For the question "How did your classmates react when they witnessed an act of bullying?", the results show that the mean for male respondents was 2.23, and for female respondents it was 2.57, suggesting that girls tend to perceive the reactions of their classmates as more involved (more positive). However, this difference is not statistically significant, as $t = -1.63$ $p = .106$ ($p > 0.05$). Therefore, we cannot confidently say that there is a real difference between the groups from a statistical point of view (Figure 9).

Regarding the reaction of teachers to bullying, the largest number of respondents (39.8%) said that teachers talked to the victim and the aggressor. This suggests that in many cases, teachers choose a communication-based approach, trying to understand both sides and mediate the conflict; 25.2% said that teachers intervened immediately, which shows a quick and direct reaction from teachers, a positive sign in terms of their active involvement in managing bullying; 17.5% said that parents were informed, which indicates a collaboration between school and family, but in a lower percentage compared to direct interventions from teachers. On the other hand, 15.5% of the respondents said that teachers did not react at all, which raises an alarm regarding the lack of involvement or ignoring bullying in some situations. A very small number of participants said that teachers sided with the aggressor, and another insignificant percentage mentioned that they did not know about the cases, which shows that such situations are rare, but still present.

The majority of respondents (45.6%) believe that teachers react differently depending on the type of bullying. Specifically, teachers may treat physical bullying more seriously than verbal bullying; 27.2% considered that the reaction is influenced "to a very large extent", which reinforces the idea that many students notice a clear difference in the way teachers react to different forms of bullying; 18.4% of the respondents chose the option "to an average extent", which means that some students believe teachers can be influenced by the type of bullying, but not always.

Most respondents (34%) considered that teachers' reaction is influenced to a very large extent by the gender of the student involved. This result suggests that some teachers may react differently depending on whether the victim is a girl or a boy; 20.4% answered that the influence is very small, which shows that there are also respondents who believe that teachers treat cases equally, regardless of the sex of the victim; 15.5% chose both the "average measure" and "small measure" options, indicating a perception of a moderate or low impact. And 14.6% of the respondents indicated that teachers' reaction is largely influenced by the sex of the victim, which reinforces the idea that some teachers may adopt a different approach depending on gender.

To see if the way teachers react differs depending on the type of bullying or the gender of the victim (H.8.), we used a frequency analysis. In general, participants believe that teachers' reactions are influenced by the type of bullying, especially when it comes

to physical (more visible) forms compared to verbal (subtler) ones. The fact that most of them answered “to a great extent” and “to a very great extent” (72.8% cumulative) supports our hypothesis that the type of bullying influences teachers’ reactions.

35 respondents (34%) believe that teachers’ reactions are influenced to a great extent by the gender of the victim, and 15 people (14.6%) chose the option “to a great extent”. These percentages show that almost half of the students believe that the gender of the victim can influence teachers’ reactions. On the other hand, 16 people (15.5%) chose the option “medium measure”, another 16 people (15.5%) said that the influence is small, and 21 people (20.4%) believe that the teachers’ reaction is influenced to a very small extent. The results show that students have divided opinions. Although a significant part believes that the victim’s gender influences the teachers’ reaction, an almost equal number of participants said that the influence is small or very small.

Our final objective (Ob. 3.) was to investigate the consequences of bullying on students. The majority of respondents (73.8%) said that verbal bullying greatly affects the emotional and mental state of those who go through such situations. Another 17.5% said that it affects them a lot, which means that almost all students agree that verbal bullying is a serious problem, even if it does not leave physical traces. Only a few people (9 persons) said it had moderate, little or very little effects, which shows that very few believe that verbal bullying is not a serious problem.

Among the consequences that physical bullying has/can have on victims, most respondents (64.1%) said that pain is one of the main consequences. This response was expected, given that physical bullying involves hitting or other forms of aggression that can cause immediate suffering; 59.2% selected social isolation, but also decreased school performance, which shows that the effects are not only physical, but also emotional and educational. Affected students end up withdrawing, avoiding classmates and even having poorer results at school due to stress or fear; 42.7% of respondents indicated physical injuries as an effect of physical bullying, which confirms that aggressions often leave visible traces and can endanger health.

For the long-term consequences that bullying has/can have on the psyche of the victims, most respondents (83.5%) said that anxiety is one of the most common consequences. This means that most students believe that victims of bullying can remain with fears, anxieties and stress even after the aggressions stop; 62.1% said that bullying can lead to a decrease in self-esteem, and 61.2% indicated depression as another serious consequence. These answers show that bullying can deeply affect the way people see themselves and the way they feel in general. Also, 53.4% believe bullying can lead to long-term professional adjustment problems, i.e. difficulties at work, lack of confidence or difficulties in social relationships as an adult.

59.2% of the respondents said that the acts of physical bullying were serious and very serious. This means that almost 60% of students believe that the physical bullying they saw or experienced was not at all easy, but on the contrary, it was serious and worrying; 26.2% considered the acts to be of medium severity, which shows that for some

students the incidents were not extreme, but not negligible either. Only 12.6% of the respondents considered them easy and very easy, which means that only a small portion of students did not perceive these situations as problematic.

The data obtained also validate the hypothesis (H.9.) that experiencing bullying has long-term consequences on the mental health of victims, since most respondents ticked the options: anxiety, depression, decreased self-esteem and professional adaptation problems, respectively, which shows us that as a result of bullying, victims can be left with long-term traumas such as those mentioned above.

Discussions

The research theme of this paper was the analysis of bullying among students, aiming to highlight the way in which this phenomenon is perceived, experienced and managed in the school environment. Following the analysis of the information collected from a convenience sample of 103 participants, we can say that the phenomenon is significantly present in the school environment, the data collected confirming that most students have been exposed to different forms of bullying, either as witnesses, victims or, in some cases, even as aggressors. The behaviors most frequently encountered were verbal and physical, and the participants' responses indicate that these manifestations are not random or isolated, but represent a constant reality in school life.

Following the testing of the research hypotheses, we were able to conclude that there are no statistical differences in the phenomenon of bullying depending on the environment of residence, in other words that the environment of residence is not a factor that influences the presence of bullying, as it can be encountered in both urban and rural schools. This is partially confirmed by the study conducted by Nansel et al. (2001) and also by Cabrera, Larrañaga and Yubero (2024). We say "partially" because the authors' findings regarding differences based on the place of residence are nuanced. Although no significant differences were identified regarding the frequency of bullying victims, Nansel et al (2001) found differences concerning the bullies, with higher percentages recorded in urban compared to rural areas, while Cabrera, Larrañaga and Yubero (2024) found that physical bullying is more present in the urban area, while in the rural area most of the victims are schoolmates. Crouch, Smith and Andersen (2025) argument that in the case of the residential environment, there is a need to refine the analysis, even if an initial analysis might or might not reveal significant differences between the two residential settings. The inclusion of additional factors in the analysis could offer a completely different perspective on bullying in these environments.

No significant statistical differences were found between respondents in terms of education level or gender, and the specialization they followed during high school is not associated with a certain level of bullying.

Regarding the level of education, studies (Bradshaw, Sawyer & O'Brennan, 2007; Nansel et al., 2001; Inchley et al., 2020) have conversely highlighted the existence of statistically significant differences among pre-university students (primary, middle, and

high school levels). One explanation for the current situation relates primarily to sample size and, secondarily, to the fact that the responses forming the basis of our analysis came from adults—specifically, high school graduates and/or current university students. The comparison was not actually made between the two educational levels themselves, but rather between the perceptions of individuals who had completed high school and those currently pursuing university studies. Retrospective studies investigating individuals' perceptions throughout their schooling (such as Lund & Ross, 2017; Su et al., 2022) have shown that respondents reported a decrease in the level of bullying experienced by the time they reached university, although the phenomenon persisted—albeit not with the same intensity or in the same forms.

Regarding gender, our research focused on analyzing differences, particularly concerning the status of girls as victims. Although studies (Nansel et al., 2001; Inchley et al., 2020) indicate a higher prevalence of the phenomenon among boys—both as victims and as aggressors—the cross-national analysis conducted by Craig et al. (2009) across approximately 40 countries, including Romania, highlighted specific regional variations; it revealed that Romania recorded high levels of bullying—in terms of both victimization and perpetration—among both boys and girls. Regional characteristics can, therefore, constitute an important factor in shaping and explaining students' behaviors regarding bullying.

Our third hypothesis, unconfirmed (“There is a statistical association between the specialization followed and the level of bullying experienced”) was formulated on an exploratory basis, without being grounded in prior studies. We do not consider its invalidation at this stage of the investigation—given the small sample size—to be sufficient grounds for rejection; rather, it warrants further exploration of this possibility, at least within the context of the school-age population in Romania.

The most common forms of bullying identified by students are physical and verbal. The most common physical behaviors include pushing, hitting and using objects for aggression, while verbal bullying is manifested by insults, nicknames or humiliation in front of classmates. From the data analysis, we found that the highest percentage of respondents experienced both physical and verbal bullying, which shows us that both forms of bullying are used frequently. Although we started from the hypothesis that there is a statistical association between the gender of the respondent and the form of bullying experienced, we found that regardless of the gender of the victim, they experienced both physical and verbal bullying. Although previous studies (Olweus, 1993; Nansel et al., 2001; Bradshaw, Sawyer & O'Brennan, 2007) identify verbal bullying as the predominant form, the analysis by Craig et al. (2009) highlighted that the situation is not identical across all countries. Even though the authors did not specifically analyze the situation in Romania in this regard, we do not rule out the possibility of a regional peculiarity that requires further in-depth investigation.

Regarding how students react to bullying, the analysis of the responses showed that many students choose to get involved in a positive way, either by helping the victim or by

actively intervening to stop the bullying. However, a significant percentage of students remain passive, stating that they were simple witnesses without intervening or that they completely ignored the situation. This suggests that, although there is a level of empathy and involvement among students, there is still a need for education and support to develop social responsibility and the courage to act in the face of injustice. The gender of the respondents does not influence the way they react to bullying. Following the analysis of the data, we could observe that the highest percentage of respondents stated that they tried to help the victim, therefore they are not indifferent, as we assumed. However, it remains worrying that a significant percentage of people responded that they noticed that witnesses to bullying not only did not help the victim, but also laughed and encouraged the phenomenon.

The formulation of our research hypothesis—that the primary reaction of witnesses to bullying is indifference—was based on a series of prior studies (Salmivalli, 2010; Salmivalli et al., 1996; Thornberg & Jungert, 2013) highlighting that non-involvement is the most common reaction among those witnessing bullying, and that intervention is driven primarily by moral factors. This concept also appears in more recent studies, such as those by Choi & Park (2021) and Campbell et al. (2023). However, the analysis of the 103 responses we collected revealed instances of witness involvement and assistance provided to the victim. What our study did not address was the witnesses' motivation, which may be moral (as argued by Thornberg & Jungert (2013) or Choi & Park (2021)) or linked to other factors—such as the relationship with the victim or aggressor, or the gender of the victim or aggressor (as suggested by Thornberg, Pozzoli, & Gini (2022); Eijigu & Teketel (2021) or Campbell et al. (2023)). Consequently, a more in-depth analysis that considers the factors influencing the attitudes of those witnessing an act of bullying, and not only the reaction itself, is essential.

Our research did not reveal a difference in reactions based on respondent gender, despite such differences being highlighted in the literature (Eijigu & Teketel, 2021; Campbell et al., 2023; Thornberg, Pozzoli, & Gini, 2022). A possible explanation could be the small sample size, as well as the fact that the previously mentioned factors—such as moral engagement or the relationship with the victim—were not taken into account; these factors could provide a much clearer picture of attitudes toward bullying.

Most teachers choose to get involved, but reactions vary. The most common reaction identified by respondents was that teachers discussed with the victim and the aggressor, adopting a mediating attitude. Most respondents indicated that the gender of the victim does not influence teachers' reaction, while the type of bullying influences teachers' reaction; teachers tend to respond more quickly and firmly in the case of physical bullying, while verbal bullying is likely to be treated more superficially. Our results confirm the findings of previous studies (Yoon & Kerber, 2003; Troop-Gordon & Ladd, 2015; Bauman & Del Rio, 2006) highlighting that teachers' reactions to bullying vary and are influenced by diverse factors—among which the type of bullying is the most significant, due to its direct implications.

The last objective pursued in this research highlighted that verbal bullying is perceived by most respondents as having profound emotional and psychological effects. Specifically, respondents believe that this type of bullying greatly affects the psychological state of victims. Physical bullying has also been associated with serious consequences, such as physical pain, social isolation, decreased school performance and, in some cases, visible physical injuries. In the long term, participants indicated consequences such as anxiety, decreased self-esteem, depression and difficulties in professional adjustment, which shows that the effects of bullying do not stop with the end of the episodes, but can mark the victims for a long time. This is in line with previous research (Moore et al., 2017; Copeland et al., 2013; Takizawa, Maughan & Arseneault, 2014), showing that bullying has long term effects on adults' mental health.

Conclusions

In this study, we sought to analyze bullying in the school environment by drawing on the retrospective recollections of adult respondents—specifically high school graduates and university students—guided by the socio-ecological model. This model considers not only the phenomenon itself but also the factors contributing to its emergence and manifestation. We examined variables such as place of residence, gender, field of study, and education level, as well as their potential influence on the intensity and types of bullying, and on the reactions of both peers and teachers. As observed, not all research hypotheses were confirmed; the small sample size offers one possible explanation for this, though specificities of the Romanian context may also play a role. Nevertheless, the study highlights the need to analyze bullying not as an isolated phenomenon, but as the complex outcome of a multitude of interdependent factors. Integrating these factors into the analysis can help explain the mechanisms underlying the emergence and manifestation of bullying in the school environment.

Limitations and future research

A major difficulty in the research was the fact that we did not have direct control over how respondents completed the questionnaire, since the application was carried out online and not physically. The online application implies that only people who had access to an internet-connected device were able to participate. In this context, certain social categories, such as those affected by marginalization, did not have access to the research tool. In addition, the research was applied on the Facebook platform, without including other online platforms, which could influence the results, given that not all internet users access the same social networks.

The sample used was a convenience sample, which means that it is not representative of the entire population, and this limits the degree of generalization of the results obtained. Also, the research was subjective, rather reflecting the perceptions of the respondents, which may not always be in line with objective reality. A possible bias would be that the study looked at school experiences from the perspective of young adults, who reflected retrospectively on their experiences and their perceived impact. Retrospective

memory can introduce errors, the intensity of some experiences can be over- or underestimated and causal relationships cannot be established.

Expanding the quantitative study—potentially by employing a mixed-methods approach—to include a nationally representative sample that also comprises pre-university students (i.e., those under the age of 18) could deepen the current study, offering a far more complex picture of the reality within the Romanian educational system.

The instrument was author-developed, non-validated, which could also represent a limitation, as a standard validated instrument could have ensured comparisons with similar studies. Future research could consider using validated scales or even the instrument designed for the present study, developed and adapted to the Romanian context. A pre-testing of the instrument, which has not been performed for the present study, should be taken into account for a future research. Direct administration could also be an option for reducing bias associated with self-administration or difficulties accessing the internet, particularly for rural respondents.

Future research could also consider a more in-depth analysis of the phenomenon in relation to the variables under discussion (such as place of residence, level of education, gender, factors influencing attitude towards bullying), which have been insufficiently explored.

Statement on the use of tools based on generative artificial intelligence

AI tools (ChatGPT) have been used for generating ideas and identifying academic sources.

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ANNEX

23. Residence environment		N	Mean	Std. Deviation	Std. Error Mean
6. What forms of bullying have you personally encountered in schools?	Urban	77	2.32	.993	.113
	Rural	26	2.04	1.183	.232

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
6. What forms of bullying have you personally encountered in schools?	Equal variances assumed	1.972	.163	1.210	101	.229	.286	.237	-.183	.755
	Equal variances not assumed			1.109	37.610	.274	.286	.258	-.236	.809

Figure 1. Independent sample T test - types of bullying according to residence environment

24. Level of education		N	Mean	Std. Deviation	Std. Error Mean
6. What forms of bullying have you personally encountered in schools?	High school	19	1.79	1.084	.249
	University	58	2.14	1.017	.133

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
6. What forms of bullying have you personally encountered in schools?	Equal variances assumed	.187	.666	-1.276	75	.206	-.348	.273	-.892	.196
	Equal variances not assumed			-1.234	29.097	.227	-.348	.282	-.926	.229

Figure 2. Independent sample T test - types of bullying according to level of education

	22. Gender	N	Mean	Std. Deviation	Std. Error Mean
3. To what extent were you a victim of bullying during your school years?	Male	52	2.62	1.223	.170
	Female	51	2.43	1.221	.171

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference		Lower	Upper
To what extent were you a victim of bullying during your school years?	Equal variances assumed	.000	1.000	.764	101	.447	.184	.241		-.294	.662
	Equal variances not assumed			.764	100.969	.447	.184	.241		-.294	.662

Figure 3. Independent sample T test – self-perceived bullying victimization according to gender

	22. Gender	N	Mean	Std. Deviation	Std. Error Mean
11. How do you rate the severity of the acts of physical bullying you have encountered??	Male	52	2.29	1.333	.185
	Female	51	2.33	1.194	.167

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference		Lower	Upper
How do you rate the severity of the acts of physical bullying you have encountered?	Equal variances assumed	.944	.334	-.180	101	.858	-.045	.250		-.540	.450
	Equal variances not assumed			-.180	100.187	.858	-.045	.249		-.540	.450

Figure 4. Independent sample T test – perceived severity of bullying according to gender

		High school profile	How do you rate the severity of the acts of physical bullying you have encountered?
High school profile	Pearson Correlation	1	.089
	Sig. (2-tailed)		.372
	N	103	103
How do you rate the severity of the acts of physical bullying you have encountered?	Pearson Correlation	.089	1
	Sig. (2-tailed)	.372	
	N	103	103

Figure 5. Correlation – high school profile - perceived severity of bullying

		High school profile	To what extent were you a victim of bullying during your school years?
High school profile	Pearson Correlation	1	.041
	Sig. (2-tailed)		.681
	N	103	103
To what extent were you a victim of bullying during your school years?	Pearson Correlation	.041	1
	Sig. (2-tailed)	.681	
	N	103	103

Figure 6. Correlation – high school profile - - self-perceived bullying victimization

		22. Gender	6. What forms of bullying have you personally encountered in schools?
22. Gender	Pearson Correlation	1	-.184
	Sig. (2-tailed)		.062
	N	103	103
6. What forms of bullying have you personally encountered in schools?	Pearson Correlation	-.184	1
	Sig. (2-tailed)	.062	
	N	103	103

Figure 7. Correlation – types of bullying - gender

	22. Gender	N	Mean	Std. Deviation	Std. Error Mean
14. How did you react when you witnessed an act of bullying while you were a student?	Male	45	1.76	.908	.135
	Female	45	1.80	.944	.141

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference		Lower	Upper
How did you react when you witnessed an act of bullying while you were a student?	Equal variances assumed	.329	.568	-.228	88	.820	-.044	.195		-.433	.344
	Equal variances not assumed			-.228	87.871	.820	-.044	.195		-.433	.344

Figure 8. Independent sample T test – reactions to bullying according to gender (witnesses)

	22. Gender	N	Mean	Std. Deviation	Std. Error Mean
15. How did your colleagues react when they witnessed an act of bullying??	Male	44	2.23	1.075	.162
	Female	44	2.57	.873	.132

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference		Lower	Upper
15. How did your colleagues react when they witnessed an act of bullying?	Equal variances assumed	5.723	.019	-1.632	86	.106	-.341	.209		-.756	.074
	Equal variances not assumed			-1.632	82.526	.106	-.341	.209		-.756	.075

Figure 9. Independent sample T test – reactions to bullying according to gender (classmates)

QUESTIONNAIRE
Bullying in Romanian schools

1. To what extent have you observed bullying situations during school?
 - ☐ Very high degree
 - ☐ High degree
 - ☐ Medium degree
 - ☐ Low degree
 - ☐ Very low degree
2. How frequent was bullying?
 - ☐ Daily
 - ☐ Weekly
 - ☐ Monthly
 - ☐ DK/NR
 - ☐ Other:
3. To what extent have you been a victim of bullying during school?
 - ☐ Very high degree
 - ☐ High degree
 - ☐ Medium degree
 - ☐ Low degree
 - ☐ Very low degree
4. To what extent have you participated/carried out bullying-type activities during school?
 - ☐ Very high degree
 - ☐ High degree
 - ☐ Medium degree
 - ☐ Low degree
 - ☐ Very low degree
5. How frequently does bullying occur/does it occur?
 - ☐ Very often
 - ☐ Often
 - ☐ Occasionally
 - ☐ Rarely
 - ☐ Very rarely
6. What forms of bullying have you personally encountered in schools?
 - ☐ Verbal bullying
 - ☐ Physical bullying
 - ☐ Both verbal and physical bullying
 - ☐ None
7. From the list below, select the forms of verbal bullying you have encountered (multiple answers can be selected).
 - ☐ Insults and insults
 - ☐ Sexist comments

- ☐ Negative or humiliating nicknames
- ☐ Degrading comments about physical appearance
- ☐ Not applicable
- ☐ Other:

8. To what extent do you consider that verbal bullying has emotional/psychological consequences on victims?

- ☐ Very much
- ☐ Much
- ☐ Moderate
- ☐ A little
- ☐ Very little

9. To what extent have you observed the presence of physical bullying in schools?

- ☐ Very much
- ☐ A lot
- ☐ Average
- ☐ A little
- ☐ Very little

10. From the list below, select the forms of physical bullying you have encountered (multiple answers can be selected).

- ☐ Pushing
- ☐ Hitting
- ☐ Using objects to hit
- ☐ I don't know / I don't answer
- ☐ Other:

11. How would you rate the seriousness of the acts of physical bullying you have encountered?

- ☐ Very serious
- ☐ Serious
- ☐ Average
- ☐ Mild
- ☐ Very mild

12. From the list below, select the consequences that physical bullying has/can have on victims (multiple answers can be selected).

- ☐ Pain
- ☐ Physical injuries
- ☐ Social isolation
- ☐ Low school performance
- ☐ Other:

13. From the list below, select the long-term consequences that bullying has/can have on victims (multiple answers can be selected).

- ☐ Anxiety
- ☐ Depression
- ☐ Low self-esteem

- o Problems with professional adjustment
- o Other:

14. How did you react, as a student, when you observed an act of bullying?

- o I tried to help the victim
- o I intervened actively
- o I was a simple witness
- o I ignored the phenomenon
- o DK/NR
- o Other:

15. How did your colleagues react when they witnessed an act of bullying?

- o They tried to help the victim
- o They actively intervened
- o They laughed and encouraged
- o They alerted a teacher
- o DK/NR
- o Other:

16. What do you think is the most effective way to respond to bullying?

- o Direct intervention by students
- o Intervention by teachers
- o Support from parents
- o Other:

17. In the cases you encountered, what was the reaction of teachers to the act of bullying?

- o They intervened immediately
- o They talked to the victim and the aggressor
- o They informed the parents
- o They did not react at all
- o Other:

18. To what extent do you think that the reaction of teachers is influenced by the type of bullying (verbal/physical)?

- o Very high degree
- o High degree
- o Medium degree
- o Low degree
- o Very low degree

19. To what extent do you think that teachers' reactions are influenced by the victim's gender?

- o Very high degree
- o High degree
- o Medium degree
- o Low degree
- o Very low degree

20. Which of the following do you think would be the most effective way to reduce bullying in schools in Romania?

- ☐ Educational campaigns for students
- ☐ Training teachers in bullying management
- ☐ Stricter legislation against bullying
- ☐ Creating an anonymous reporting system
- ☐ Encouraging a safe and inclusive school environment

21. Age

- ☐ 18-25 years' old
- ☐ 25-30 years' old

22. Sex

- ☐ Female
- ☐ Male
- ☐ Other:

23. Residence environment

- ☐ Urban
- ☐ Rural

24. Education level

- ☐ High school
- ☐ University
- ☐ Post-university

25. What major did you study in high school?

- ☐ Social sciences
- ☐ Natural sciences
- ☐ Mathematics-computer science
- ☐ Philology
- ☐ Other:

26. What high school did you graduate from?

- ☐ Theoretical
- ☐ Technological

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Effects of Collaborative Learning Strategy on Reading Comprehension and Fluency: A Quasi-Experimental Study among Junior Secondary Students in Kano State, Nigeria

Abiodun JIMOH*, Babatunde Akinwande AKINGUNLOYE**, Omolara Omotayo JIMOH***

Abstract

This study examined the effect of a collaborative learning strategy on the reading comprehension and reading fluency of Junior Secondary School III students in Kano State, Nigeria. Reading comprehension and fluency are critical components of academic success at the secondary-school level, yet many students continue to experience persistent difficulties in these areas. The study was guided by two objectives and adopted a quasi-experimental pre-test–post-test control-group design. The population comprised 626 students, from which a sample of 60 students was drawn. Two intact classes were selected and randomly assigned to the experimental group ((n = 30)) and control group ((n = 30)). Data were collected using the English Language Achievement Test, which yielded a test–retest reliability coefficient of .80. The experimental group was exposed to structured collaborative learning activities for eight weeks, while the control group received conventional teacher-centred instruction. Data were analysed using mean, standard deviation, and independent-samples (t)-test at the .05 level of significance, while Cohen's (d) was used to determine effect size. The findings revealed no statistically significant difference between the groups at the pre-test stage. However, significant post-test differences were found in reading comprehension, ($t(58) = 6.40$), ($p < .001$), ($d = 1.65$), and reading fluency, ($t(58) = 19.54$), ($p < .001$), ($d = 5.04$), in favour of the collaborative learning group. The study concluded that the collaborative learning strategy was associated with substantial improvements in students' reading comprehension and fluency. It was therefore recommended that English-language teachers integrate structured collaborative learning activities into classroom instruction to improve reading outcomes among secondary-school students.

Keywords: Collaborative Teaching, Reading Comprehension, Reading Fluency, Education, Secondary school

* PhD., Federal College of Education, Ilawe Ekiti, Nigeria, abiodunjimoh101@gmail.com

** PhD., Federal College of Education, Ilawe Ekiti, Nigeria, akingunloy@gmail.com <https://orcid.org/0000-0002-6183-0724>, corresponding author

*** Federal College of Education, Ilawe Ekiti, Nigeria Aboderinomolara25@gmail.com



Introduction

One of the most effective strategies for both lifetime learning and academic success is reading. The ability to read fluently and understand texts meaningfully is no longer viewed as a limited language skill in today's classrooms, but rather as the cornerstone of success in all subject areas. Students who read comprehensibly, accurately, and at a suitable pace are better equipped to interact with material in social studies, science, math, and other subjects. On the other hand, ongoing reading challenges frequently result in more general academic difficulties, low self-esteem, and little involvement in class activities. Reading comprehension and fluency are key indicators of academic success and long-term educational outcomes, according to recent empirical research (Kim, 2017; Rasinski, 2016; Mihret & Joshi, 2025).

Decoding printed words is only one aspect of reading comprehension; it requires readers to construct meaning through interaction with text, background knowledge, vocabulary, and strategic thinking. Comprehension is an active, constructive process in which learners monitor understanding, infer meaning, and integrate new information with prior knowledge (Oakhill, Cain, & Elbro, 2015; Lapasau & Virgana, 2023). At the same time, reading fluency which is commonly defined as the ability to read with accuracy, appropriate rate, and prosody serves as a bridge between word recognition and comprehension. When students struggle with fluency, cognitive resources are disproportionately allocated to decoding, leaving little capacity for meaning-making (Paige, Rasinski, & Magpuri-Lavell, 2018). In this regard, fluency and comprehension are mutually reinforcing components of skilled reading rather than isolated abilities.

Even though reading proficiency is acknowledged to be important, many secondary school students still struggle in these areas. Concerns regarding declining reading standards and low text engagement have been extensively documented in educational discourse in a number of developing nations, including Nigeria. While classroom observations often show students reading slowly, losing track of ideas, and exhibiting limited inferential understanding, national assessments often highlight broader achievement concerns. These trends imply that conventional teacher-centered teaching strategies might not adequately encourage students to actively engage with texts or offer chances for peer interaction and guided practice. Learner-centered pedagogies that position students as active participants in knowledge construction rather than passive recipients of information are becoming more and more popular in international research (Gillies, 2016; Slavin, 2015; Mir, 2025).

One instructional approach that has gained considerable attention in recent years is collaborative learning. Collaborative learning refers to structured instructional practices in which students work together in small groups to achieve shared academic goals, engage in dialogue, and support one another's understanding (Yang, 2023; Ramzan et al., 2023). Unlike unstructured group work, effective collaboration involves clearly defined roles, shared

accountability, and purposeful interaction. A well-designed collaborative learning environments according to Leow and Neo (2023) can enhance cognitive engagement, promote deeper processing of texts, and improve academic outcomes across disciplines. Through discussion, explanation, and peer feedback, learners are exposed to multiple perspectives that can clarify misunderstandings and extend comprehension.

The instructional value of collaborative approaches in literacy education is supported by recent empirical research. Ramzan et al (2023) highlights that guided oral practice and repeated reading, which are frequently incorporated into group activities, greatly increase reading rate and expressive reading. The need for instructional strategies that offer meaningful reading practice is further highlighted by Paige et al. (2018), who show a strong correlation between higher academic performance and expressive and fluent reading. Additionally, when properly implemented, cooperative and collaborative learning structures have a positive impact on students' academic achievement, according to meta-analytic evidence (Slavin, 2015; Güngör et al., 2026). Crucially, these advantages seem to be most noticeable when teamwork is deliberate, organized, and in line with specific learning objectives.

Although research from around the world shows that collaborative learning can improve literacy outcomes (Jaya et al., 2025; Ramdani and Susilo 2022; Lopez & Estremera, 2025), there is still a need to examine its effectiveness in specific educational settings. Educational practices are shaped by cultural norms, classroom realities, teacher preparation, and resource availability. In many Nigeria secondary schools, reading instruction often emphasizes teacher explanation and individual silent reading, with limited structured peer engagement. As a result, students may not receive sufficient opportunities to practice oral reading, negotiate meaning with peers, or develop metacognitive awareness through discussion. By examining the effects of a structured collaborative learning strategy on reading comprehension and fluency among Junior Secondary School III students in Kano State, the research sought to contribute empirical evidence to ongoing conversations about effective literacy instruction. In doing so, it responds to the growing recognition that improving reading outcomes requires not only curriculum alignment but also pedagogical innovation grounded in research and responsive to local classroom realities.

Problem Statement

There have been growing concerns among educators, school administrators, parents, and policymakers regarding the declining reading culture and persistent reading difficulties among secondary school students. Many students fail to acquire the fundamentals of reading when they move from primary to junior secondary school, and this gap frequently gets wider as academic demands rise. Low comprehension levels, sluggish reading rates, restricted vocabulary growth, and diminished confidence in interacting with academic texts have all

resulted from this. Despite the fact that reading is essential for success in every subject, many schools still primarily use teacher-centered teaching strategies that offer little chance for guided reading practice and active student participation.

Explanation of passages and solitary silent reading are often the main focus of instruction in English language classrooms, with little organized peer interaction. While such approaches may cover syllabus content, they may not sufficiently address students' fluency challenges or promote deeper comprehension. Collaborative learning strategies have been widely recommended in recent educational research as a means of improving engagement and academic achievement (Gillies, 2016; Johnson & Johnson, 2019; Güngör et al., 2026). These strategies encourage dialogue, peer support, shared responsibility, and active participation, all of which are theoretically linked to improved literacy development. However, despite the documented benefits of collaborative approaches in various educational contexts, their systematic application in secondary schools in Nigeria remains limited or inconsistently implemented.

Therefore, the crucial question is whether Junior Secondary School III students' reading comprehension and fluency can be greatly enhanced by using an organized collaborative learning strategy. Schools in Kano State, and especially in the Tofa Zonal Educational Area, still use conventional teaching methods. While some teachers occasionally involve their students in group activities, it is unclear whether these practices are organized, supported by research, or successful in raising quantifiable reading outcomes. Additionally, there isn't much empirical data in this area that unequivocally shows how collaborative learning affects comprehension and fluency at the same time.

Understanding the efficacy of cutting-edge teaching techniques is crucial since reading proficiency is a prerequisite for academic success. However, not many intervention-based studies have been carried out in this particular educational context to determine whether collaborative learning can produce meaningful improvements in students' reading performance. The absence of empirical evidence leaves a gap in both practice and policy decisions related to literacy instruction. Consequently, the present study was designed to examine the effect of collaborative learning strategy on reading comprehension and fluency among Junior Secondary School III students in Tofa Zonal Educational Area, Kano State.

Theoretical Framework

This theoretical framework for this study is based on Gough and Tunmer's Simple View of Reading theory. This theory describes reading comprehension as the result of two interdependent processes: decoding and language comprehension (Blaži, 2023). Decoding is the precise and efficient recognition of written words, whereas language comprehension is the ability to understand terminology, sentence structures, ideas, and relationships presented in both oral and written language (Kargin et al., 2024). The concept emphasises

that successful reading comprehension requires adequate development in both components, as deficiencies in either decoding or language comprehension may limit a learner's capacity to infer meaning from text. The Simple View of Reading is significant to this study since reading fluency is strongly linked to efficient decoding (Hsu et al., 2023). When students read words correctly, automatically, and at an acceptable rate, fewer cognitive resources are allocated to recognising specific words. This permits more attention to be focused on learning terminology, drawing inferences, identifying important concepts, and integrating information throughout a chapter. In contrast, sluggish and imprecise reading can disrupt meaning construction and impede understanding.

The model is linked to the current study by reading processes that are embedded in collaborative learning activities. Guided oral reading, regular practice, peer modelling, and fast corrective feedback can help improve decoding accuracy, automaticity, and reading rate. Similarly, group discussion, questioning, explanation, and shared interpretation can improve language comprehension by assisting students in clarifying difficult vocabulary, connecting concepts, and negotiating text meaning. The Simple View of Reading thus provides a reading-specific explanation of how collaborative learning can improve both fluency and comprehension. It adds to social constructivist theory by highlighting the cognitive reading components that enable socially mediated education to yield better literacy results among secondary school pupils.

Objectives of the Study

The main objectives of the research are:

1. To determine the effect of collaborative learning strategy on reading comprehension of JSS III students in Kano State, Nigeria.
2. To examine the effect of collaborative learning strategy on reading fluency of JSS III students in Kano State, Nigeria.

Hypothesis of the Study

1. There is no significant difference in the mean reading comprehension scores of JSS III students in Kano State, Nigeria, who are taught using collaborative learning strategy and those taught using the conventional teaching method.
2. There is no significant difference in the mean reading fluency scores of JSS III students in Kano State, Nigeria, who are taught using collaborative learning strategy and those taught using the conventional teaching method.

Methodology

Research Design

The study used a quasi-experimental, pre-test-post-test control-group design. The design consisted of an experimental group taught using a structured collaborative learning strategy and a control group taught using the traditional teacher-centered approach. Both groups took pre- and post-tests on reading comprehension and fluency. The design was ideal since it allowed the researchers to compare the two groups' performance before and after the intervention and establish the effectiveness of the teaching strategy. Because intact classes were employed, the study was classified as quasi-experimental rather than experimental.

Population and Sampling Technique

The population consisted of all 626 Junior Secondary School III pupils from Army Day Government Secondary School, Janguza, in Kano State's Tofa Zonal Educational Area. These kids were deemed eligible because they had received core English-language education and were developmentally ready for structured collaborative reading activities. A sample of sixty pupils was chosen. Two intact JSS III classes that were deemed suitable for the study were purposefully chosen and randomly allocated to the experimental and control groups. Each class included 30 pupils. The experimental group received education utilising the collaborative learning strategy, whereas the control group was instructed using the traditional manner. Random assignments were made to complete classes rather than individual pupils.

Instrument for Data Collection

The English Language Achievement Test was developed to collect information about reading comprehension and fluency. The reading comprehension section featured a paragraph followed by ten multiple-choice questions. Each correct answer earned three points, for a maximum score of 30.

The reading-fluency section requires each student to read aloud a 50-word chapter in one minute. Fluency was tested in terms of accurate words per minute. The assessor noted the total number of words attempted and deducted reading errors such as omissions, substitutions, mispronunciations, and assessor-supplied words. Repetitions were not considered additional correct words, although rapid self-corrections were acknowledged as correct. Because the paragraph had 50 words and the reading time was one minute, each correctly read word was worth one mark. Thus, the words-corrected-per-minute value was directly proportional to a score on a 50-point scale. For example, a student who attempted all 50 words and made six mistakes received a score of 44.

Experts in English Language, Special Education, and Measurement and Evaluation validated the instrument on both the face and content levels. Their observations were used

to enhance clarity, relevance, and connection with the study's aims. A pilot research was carried out with pupils from a comparable school outside the study area. The stability of the instrument was established through the test-retest method, which produced a reliability coefficient of .80, indicating an acceptable level of consistency over time.

Treatment Procedure

The treatment lasted eight weeks. The same English-language teacher instructed both the experimental and control groups. Using a single instructor helps to reduce variability caused by variances in teachers' credentials, experience, instructional competency, and classroom management. Prior to the intervention, the instructor was given an orientation on the collaborative learning strategy's aims and methods.

Students in the experimental group were divided into small groups and given responsibilities such as group leader, reader, recorder, and summariser. They took part in guided reading, peer discussion, shared text interpretation, collaborative replies to comprehension questions, and reciprocal feedback on their oral reading performance. Roles were swapped to encourage participation and personal accountability. The conventional group received identical reading passages from the same teacher using the standard technique. Individual reading, teacher-directed question-and-answer exercises, and instructor explanation were all part of the instruction. Both groups were given the identical content, lesson objectives, instructional length, and assessment circumstances. The main distinction was the educational technique adopted. To reduce contamination, the groups were taught separately, and new lesson plans were created for each condition.

The intervention was conducted twice weekly for eight weeks, with each session lasting 40 minutes, resulting in 16 instructional sessions and a total contact time of 640 minutes.

Treatment Fidelity

Treatment fidelity was assessed using a standardised observation checklist based on the collaborative-learning lesson plan. The checklist determined if the teacher organised the required groups, allocated student responsibilities, supported guided reading, fostered peer discussion, offered opportunities for repeated oral reading, promoted peer feedback, and completed the intended activities.

The intervention achieved a fidelity score of 90, suggesting strong and acceptable adherence to the intervention plan. The control lessons were also inspected routinely to ensure that collaborative-learning processes were not implemented.

Ethical Considerations

Prior to beginning the study, permission was acquired from the school administration. Students were told about the research's goal and methodology, and their participation was entirely optional. Their identities and scores were kept private, and the data obtained was

used solely for academic purposes. Because the participants were secondary school students, parental or guardian agreement as well as student assent were sought.

Data Collection and Analysis

Prior to the intervention, both groups were given a pre-test to evaluate their baseline reading comprehension and fluency. Following the eight-week treatment, a post-test was conducted under similar conditions.

The researchers employed mean and standard deviation to answer their questions. Independent-samples t-tests were performed to determine pre-test equivalency and compare post-test scores between the two groups at the .05 significant level. The independent-samples t-test was appropriate because the study compared the mean reading-comprehension and reading-fluency scores of two separate groups. Cohen's d was used to estimate the practical magnitude of the treatment effect. Prior to doing the independent-samples t-tests, the assumptions of normality and variance homogeneity were checked. The Shapiro-Wilk test and Q-Q plot examination were used to examine normality, while Levene's test was used to verify variance homogeneity. The results showed no significant violation of normality or variance homogeneity for the reading comprehension and reading fluency scores; thus, the independent-samples t-test was deemed suitable.

Findings

Research Question One: What is the difference in the mean reading comprehension scores of JSS III students in Kano State, Nigeria, who are taught using collaborative learning strategy and those taught using the conventional teaching method?

Table 1: Descriptive statistics (mean and standard deviation) in Pre-test and Post-test Reading Comprehension Scores of JSS III Students

Variable	N	Mean	Standard
Deviation			
Pre-test:			
Collaborative	30	11.23	3.41
Conventional	30	10.87	3.56
Post-test:			
Collaborative	30	17.60	3.76
Conventional	30	10.90	4.33

Source: Field Work, 2026

Table 1 reveals that the collaborative-learning group had a pre-test mean score of 11.23 with a standard deviation of 3.41, compared to the conventional-method group's mean score of 10.87 with a standard deviation of 3.56. The pre-test mean difference of 0.36 suggests that the groups had similar reading comprehension skills prior to the intervention.

At the post-test stage, the collaborative-learning group received a mean score of 17.60 with a standard deviation of 3.76, whereas the conventional-method group received a mean score of 10.90 with a standard deviation of 4.33. The post-test mean difference of 6.70 benefited the collaborative-learning group. This suggests that students taught using the collaborative learning strategy had a better gain in reading comprehension than those taught using the standard method.

Research Question Two: What is the difference in the mean reading fluency scores of JSS III students in Kano State, Nigeria, who are taught using collaborative learning strategy and those taught using the conventional teaching method?

Table 2: Descriptive statistics (mean and standard deviation) in Pre-test and Post-test Reading Fluency Scores of JSS III Students

Variable	N	Mean	Standard Deviation
Pre-test:			
Collaborative	30	20.45	2.98
Conventional	30	20.12	3.05
Post-test:			
Collaborative	30	34.30	3.01
Conventional	30	19.78	2.75

Source: Field Work, 2026

Table 2 reveals that the collaborative-learning group had a pre-test mean fluency score of 20.45 with a standard deviation of 2.98, whereas the conventional-method group had a mean of 20.12 with a standard deviation of 3.05. The pre-test mean difference of 0.33 suggests that the groups had similar reading-fluency performance prior to the intervention.

At the post-test stage, the collaborative-learning group had a mean score of 34.30 with a standard deviation of 3.01, whereas the conventional-method group received a mean score of 19.78 with a standard deviation of 2.74. The post-test mean difference of 14.52 benefited the collaborative-learning group. This suggests that students taught using the collaborative learning strategy had a better gain in reading fluency than those taught using the standard method.

Research Hypothesis One:

Pretest Equivalence of Groups

Before the commencement of the treatment, a pretest was administered to both the experimental and control groups to determine their baseline reading comprehension and reading fluency levels. The purpose of this analysis was to establish whether there was any significant difference between the two groups prior to the intervention. Establishing pretest equivalence is important in quasi-experimental studies because it strengthens the internal validity of the findings by demonstrating that both groups were comparable at the outset.

An independent samples t-test was conducted to compare the pretest mean scores of the experimental and control groups. The results are presented in Table 3.

Table 3: Independent Samples t-Test Showing Pretest Equivalence of Experimental and Control Groups

Variable	Group	N	Mean (M)	SD	df	t- value	p- value	Decision
Reading Comprehension	Collaborative	30	11.23	3.41	58	0.40	0.691	Not Significant
	Conventional	35	10.87	3.56				
Reading Fluency	Collaborative	30	20.45	2.98	58	0.42	0.673	Not Significant
	Conventional	30	19.78	3.05				

Significance level: $\alpha = .05$.

Table 3 shows that the collaborative group had a mean reading comprehension score of 11.83 (SD = 3.41), while the control group's mean score was 11.40 (SD = 3.18). The estimated p-value of 0.640 and t-value of 0.47 both exceed the significance level of 0.05. This shows that prior to the intervention, there was no statistically significant difference in reading comprehension between the two groups. Similarly, the experimental group's reading fluency score was 20.15 (SD = 2.95), compared to the conventional group's score of 19.78 (SD = 3.02). The computed t-value of 0.59 and p-value of 0.557 show that the difference was not statistically significant at the 0.05 level. These results confirm that both groups had comparable reading comprehension and fluency levels prior to the deployment of the collaborative learning technique. As a result, any substantial variations in post-test scores can safely be attributed to the influence of the treatment rather than pre-existing disparities between the groups.

Hypothesis One (Reading Comprehension)

There is no significant difference in the mean reading comprehension scores of JSS III students in Kano State, Nigeria, who are taught using collaborative learning strategy and those taught using the conventional teaching method.

To test this hypothesis, the post-test reading comprehension scores of students in the experimental and control groups were analyzed using an independent samples t-test at the 0.05 level of significance. The results are presented in Table 4.

Table 4: Independent Samples t-test on Post-test Reading Comprehension Scores of JSS III Students

Group	N	Mean	SD	Mean Difference	Df	t-cal	P Value	Cohen's d
Collaborative	30	17.60	3.76	6.70	58	6.40	0.001	1.65
Conventional Method	30	10.90	4.33					

Significance level: $\alpha = .05$. Cohen's d interpretation: 0.20 = small, 0.50 = medium and 0.80 = large.

Table 4 shows that students taught using the collaborative learning strategy had a higher post-test mean reading-comprehension score of 17.60, with a standard deviation of 3.76, than students taught using the traditional method, who had a mean score of 10.90, with a standard deviation of 4.33.

The difference between the groups was statistically significant, $t(58) = 6.40$, $p < .001$. The null hypothesis was thus rejected. The Cohen's d value of 1.65 implies a significant practical influence. This suggests that the difference was not only statistically significant, but also educationally significant, as the collaborative learning technique significantly improved students' reading comprehension skills.

Hypothesis Two (Reading Fluency)

There is no significant difference in the mean reading fluency scores of JSS III students in Kano State, Nigeria, who are taught using collaborative learning strategy and those taught using the conventional teaching method.

To test this hypothesis, the post-test reading fluency scores of students in the experimental and control groups were analyzed using an independent samples t-test at the 0.05 level of significance. The results are presented in Table 5.

Table 5 reveals that students taught using the collaborative learning strategy had a higher post-test mean reading-fluency score of 34.30, with a standard deviation of 3.01, than students taught using the traditional method, who had a mean score of 19.78, with a standard deviation of 2.74. The difference between the groups was statistically significant, $t(58) = 19.54$, $p < .001$. The null hypothesis was thus rejected. Cohen's d value of 5.04 implies a very substantial practical effect. Thus, when compared to traditional teaching methods, the collaborative learning strategy significantly improved students' reading-fluency performance. However, the extraordinarily significant impact size for reading necessitates thorough verification of the raw data, scoring technique, group allocation, and assessment process. Such a magnitude may reflect a highly effective intervention, but it may also arise

from restricted score variability, measurement effects, assessor bias or other methodological factors.

Table 5: Independent Samples t-test on Post-test Reading Fluency Scores of JSS III Students

Group	N	Mean	SD	Mean Difference	Df	t-cal	P Value	Cohen's d
Collaborative	30	34.30	3.01	14.52	58	19.54	<.001	5.04
Conventional Method	30	19.78	2.74					

Significance level: $\alpha = .05$. Cohen's d interpretation: 0.20 = small, 0.50 = medium and 0.80 = large.

Discussion of findings

The data on reading comprehension demonstrated that there was no statistically significant difference between the collaborative and traditional groups at the pre-test stage, implying that the groups were equivalent prior to the intervention. The collaborative learning group outperformed the traditional group at the post-test stage, with a considerably higher mean score ($t(58) = 6.40$, $p < .001$). The impact size was also quite large, with Cohen's $d = 1.65$, showing that the difference was both statistically significant and educationally significant. These findings indicate that the structured collaborative learning technique had a significant impact on the improvement in students' reading comprehension performance.

This finding is consistent with research on cooperative and collaborative learning. For example, Slavin (2015) proved that structured cooperative learning improves academic accomplishment when compared to standard teaching approaches, especially when learners have comparable baseline ability. Similarly, Gillies (2016) found that guided peer contact improves deeper cognitive engagement and comprehension through debate and collaborative meaning-making. The data further support Johnson and Johnson's (2019) argument that collaborative learning environments improve accomplishment through positive interdependence, individual accountability, and promotional engagement.

Beyond these basic investigations, the current findings are supported by more recent empirical and meta-analytic data. In a second-order meta-analysis, Güngör et al. (2026) demonstrated that cooperative learning had a significant favourable effect on academic success, higher-order thinking, and affective outcomes. This lends support to the theory that collaborative learning might improve comprehension by stimulating deeper processing and critical engagement with materials. Similarly, Jaya et al. (2025) stressed that peer interaction allows students to co-create knowledge and address ambiguities together. Lapasau and Virgana (2023) discovered that cooperative learning improved reading comprehension by

increasing students' involvement and self-efficacy, both of which are necessary for effective text processing..

From a theoretical standpoint, the reading comprehension findings are compatible with Vygotsky's social constructivist theory, specifically the Zone of Proximal Development. Learners who connect with peers may be able to complete tasks that would be more difficult to complete separately. The organised collaborative tasks utilised in the study likely allowed for scaffolding, dialogue, explanation, and shared cognitive accountability. These procedures may have helped students clarify meanings, link ideas, and have a better grasp of the reading passages.

In terms of reading proficiency, the findings revealed no statistically significant difference between the groups in the pre-test stage. The collaborative learning group outperformed the traditional group in post-test scores ($t(58) = 19.54$, $p < .001$). Cohen's $d = 5.04$ suggested a very substantial practical effect. This shows that collaborative learning activities resulted in a significant improvement in students' ability to read accurately and at the right rate. The extent of the fluency effect should, however, be evaluated with caution. Although the results show a significant difference between the groups, such a substantial effect could possibly be attributed to the confined 50-mark scoring range, relatively low variation among the groups, sample characteristics, or assessment technique aspects. As a result, the findings provide strong evidence in the research environment, but they must be replicated using larger samples, other schools, and additional fluency metrics.

The fluency finding is consistent with Rasinski's (2016) observation that fluency develops through guided oral reading, frequent practice, and meaningful interaction with texts. Similarly, Paige, Rasinski, and Magpuri-Lavell (2018) discovered that repetitive and expressive reading exercises boost reading pace and prosody, especially when combined with interactive instructional strategies. The collaborative learning environment used in this study allowed for peer-assisted reading, modelling, repeated practice, and quick feedback, which could have contributed to the observed improvement.

Recent research lends weight to this interpretation. Ramzan et al. (2023) found that collaborative tactics improve vocabulary learning and motivation, perhaps supporting the development of reading fluency. Lopez and Estremera (2025) discovered that collaborative learning approaches in language classes foster prolonged peer engagement while also improving fluency and communicative competence. Leow and Neo (2023) also recognised structured engagement, explicit responsibilities, and shared accountability as critical variables in increasing students' collaborative learning experiences and performance. The ability to provide quick feedback, modelling, and correction within peer groups may also contribute to improved reading skills. Gillies (2016) found that collaborative spaces allow students to watch appropriate performance, practise repeatedly, and receive constructive criticism. Furthermore, Ramdani and Susilo (2022) discovered that collaborative learning

enhances cognitive and metacognitive skills, allowing learners to monitor and modify their reading performance. Taken together, the data show that structured collaborative learning can improve reading comprehension and fluency. The findings are consistent with learner-centred approaches that highlight active participation, interaction, and engagement as critical components of effective instruction (Mir, 2025). They also support the broader premise that enhanced reading skills can help pupils attain academic success in all subject areas (Mihret & Joshi, 2025).

According to the findings, organised collaborative learning was related with considerably improved reading comprehension and fluency outcomes than traditional teaching methods among the participating students. The findings encourage increased use of carefully planned peer interaction, guided reading, repeated oral practice, and shared interpretation in junior secondary reading education, while acknowledging the need for additional study to confirm the extraordinarily substantial benefit.

Implications of the Findings

Practical Implications: The significant improvement in the collaborative group's post-test scores, reading comprehension and fluency indicates that structured peer interaction enhances learning outcomes. This implies that teachers should adopt collaborative strategies such as group reading, peer discussion, and guided feedback. These practices are important because they directly address students' initial low performance and provide opportunities for active engagement, repeated practice, and immediate correction, which were lacking in conventional methods.

Theoretical Implications: The findings support Lev Vygotsky's social constructivist theory. The observed gains suggest that students benefited from interaction within their Zone of Proximal Development, where peer support and scaffolding improved comprehension and fluency. The equivalence at pre-test and divergence at post-test confirm that learning was socially mediated rather than individually constructed.

Policy and Research Implications: The strong statistical differences in post-test outcomes ($t = 6.41$ for comprehension; $t = 19.55$ for fluency) highlight the need for policy shifts toward learner-centred pedagogy. Educational authorities should promote collaborative learning in curricula and teacher training. Additionally, the findings justify further research to test scalability across schools and over longer periods.

Conclusion

The study concluded that collaborative teaching strategies significantly improved reading comprehension and fluency among JSS 3 students. The findings clearly demonstrated that students who were exposed to collaborative instructional approaches performed better than those who were taught using conventional teaching methods. Through structured group interactions, peer support, and shared learning experiences, students were able to enhance

their understanding of texts and develop stronger comprehension skills.

Recommendations

Based on the findings of the study the following recommendations were made

There is need to institutionalise structured collaborative learning: Teachers should consistently implement role-based group reading, likereader, summariser, and evaluator. This is important because the findings show substantial gains in comprehension and fluency, indicating that peer interaction and guided dialogue enhance meaning-making and reading practice.

Targeted teacher professional development: Schools should train teachers on designing and managing collaborative tasks like group formation, scaffolding, feedback. This is essential to ensure fidelity of implementation; poorly structured group work will not reproduce the strong effects observed.

Embed collaborative practices in curriculum and lesson planning: Curriculum guidelines should require scheduled collaborative reading sessions and oral practice. This ensures sustainability and alignment with learning objectives, translating the demonstrated benefits into routine classroom practice.

Strengthen assessment to capture fluency and interaction: Include oral reading measures (e.g., words-correct-per-minute) and group-based comprehension tasks. This is important to monitor gains reflected in the study and to reinforce behaviours (practice, feedback) that drive improvement.

Limitations of the Study

The study was limited to only 60 JSS III students from a single secondary school in Kano State's Tofa Zonal Education Area. As a result, the findings may not apply to all junior secondary pupils in Kano State or other educational contexts. The intervention lasted only eight weeks, limiting the ability to measure long-term retention of reading benefits. Furthermore, the same teacher taught both groups, which helped to control teacher differences but may not have totally removed potential treatment contamination. The fluency examination was based on a single 50-word oral-reading passage, which may not have covered all aspects of reading fluency, including prosody. Despite these limitations, the study provides valuable information about the potential benefits of organised collaborative learning for enhancing reading comprehension and fluency.

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Teaching Vocabulary to Students with Specific Learning Disabilities

Başak Pınar YÜKSEL*, Sunay Yıldırım DOĞRU**, Feryal ÇUBUKÇU***

Abstract

This study examined the effect of the multisensory activities in teaching sports-related words (basketball) on a student with specific learning disabilities (dyslexia). The aim of the study was to investigate the effect of this technique, based on the interests of the students, on vocabulary teaching. A single subject design was used and the participant was a 10-year-old male student diagnosed with specific learning disabilities (dyslexia). Data were collected through observation, lesson records and criterion-referenced measurement tools during six-week lesson sessions. The results of the study showed that the goal to learn the target vocabulary was achieved and the student's motivation for learning increased through the lesson plans developed in accordance with the student's interests.

Keywords: Dyslexia, Vocabulary teaching, Multisensory, Interest, Motivation

1.Introduction

Educating children with learning disabilities (LD) is an area that requires a different approach than traditional teaching methods. Specific learning disabilities such as dyslexia can create significant difficulties in students' reading and writing language skills. This poses a great challenge for both students and educators. In particular, the difficulties that students

* Dokuz Eylül University, basak.pinary@gmail.com

** .Prof. Dr, Chair of Special Education Department, Dokuz Eylül University, sunay.dogru@deu.edu.tr

*** Prof.Dr., Chair of the Department of Foreign Languages Education, Dokuz Eylül University, cubukcu.feryal@gmail.com, corresponding author



with dyslexia face in traditional classroom environments reinforce the view among educators that these students should be supported by separating them from the classroom. (Gosiewska Turek, 2020) However, research shows that in addition to using a wide range of methods and approaches, the guidance and support of the teacher are two important factors that enable a child with learning disabilities to overcome these difficulties. (Erkan, Kızılaslan & Yıldırım Doğru, 2012; Krzyzak, 2006). In addition, going beyond traditional methods, innovative methods and techniques of multisensory teaching are effective in developing the language and academic skills of students with learning disabilities and are being implemented in various countries by being integrated into the education system. (Ahmad, Ludin, Ekhsan, Rosmani & Ismail, 2012; Balcı & Çayır, 2017; Gyarmathy, Mahlerbe, Pichel, Stoyanov & Tartari, 2009; Hazoury, Oweini & Bahous, 2009; Ho, Lam & Au, 2001; Majzub, Abdullah & Aziz, 2012; Mehrabi, Zarbakhsh & Rahmani, 2014; Nijakowska, 2013; Nourbakhsh, Mansor, Baba & Madon, 2013; Obaid, 2013). The findings that multisensory teaching techniques are effective for children with learning disabilities are increasingly accepted in the relevant literature. Multisensory teaching aims to make students' learning processes more effective by combining their visual, auditory, tactile and kinesthetic senses. (Erkan, Kızılaslan & Yıldırım Doğru, 2012). This technique helps students by using more than one sensory channel in the language learning process, thus making the learning experience more enjoyable and memorable, which makes it easier for information to be better retained in memory. (Kormos & Smith, 2012; Nijakowska, 2013).

2. Review of Literature

Multisensory teaching provides a more effective learning experience for students with learning disabilities by allowing the teacher to help students using more than one sensory channel in the language learning process. This strategy allows students to both receive more stimulation and understand information from different perspectives, which is why the simultaneous use of visual, auditory, kinesthetic and tactile sensory channels is employed in remedial and intervention teaching, especially for students with learning disabilities. (Birsh, & Carreker, 2018; Magpuri-Lavell, Paige, Williams, Akins & Cameron, 2014). Sparks et al. (1998) recommend multisensory structured language teaching as a technique that encourages explicit and direct teaching of second language phonology through seeing, hearing and doing. Studies examining the benefits of multisensory teaching techniques in teaching English to individuals with specific learning disabilities reveal that these strategies provide significant improvements in students' language learning processes. Algrni (2020) stated that multisensory teaching strengthens learning by combining visual, auditory and kinesthetic-tactile tasks and that these techniques positively affect both the development of vocabulary and the long-term retention of this information in students with learning disabilities. Similarly, Korkmaz and Karatepe's study (2018) revealed that multisensory

teaching techniques provide significant improvements in English reading skills. The study stated that multisensory materials and activities make the learning process more effective and interesting, and increase students' participation in lessons. Teachers emphasized that these techniques increase students' motivation and enable them to participate more actively in the learning process (Korkmaz & Karatepe, 2018). Motivation is as critical a factor in teaching students with learning disabilities. Students' beliefs that they can master something is very important for a successful learning experience. Students with high motivation levels are more likely to participate in learning activities, put in effort, and seek solutions instead of giving up when faced with difficulties. Motivation becomes a critical element of academic success by affecting cognitive engagement and self-regulated learning (Schunk & Mullen, 2012). Children with learning disabilities often experience a loss of motivation because they experience delays in their achievement. In particular, students with learning disabilities may be anxious about their academic competence when they compare themselves with their classmates, causing them to feel like failures. Humphrey and Mullins (2002) emphasize that teachers have a direct impact on students' self-confidence development and that unfair teacher attitudes might lead individuals with learning disabilities such as dyslexia to lose self-confidence. Indeed, studies have shown that individuals with learning disabilities are disappointed and feel isolated when they make comparisons with their classmates. These comparisons, especially in areas such as reading, writing and spelling skills, lead students' academic motivation to decrease (Humphrey & Mullins, 2002). It has been stated that children with learning disabilities need to be supported by their teachers and educators and that their motivation can be increased with this support. Teachers play an important role in increasing student motivation and self-efficacy. Effective teaching strategies, encouragement and constructive feedback increase students' confidence in their learning skills (Schunk & Mullen, 2012). At this point, it is of great importance for teachers to be sensitive to individual differences, adopt a flexible approach in the teaching process and establish strong communication with students. Students participate more in the educational process when they have teachers who understand and support them, and an increase in their academic success is observed (Humphrey & Mullins, 2002). In this context, multisensory teaching methods make students' success visible and increase their motivation by providing them with continuous feedback. Students with high self-efficacy levels take more academic risks, make more effort in the learning process and turn out to be more resilient in achieving their academic goals. Students with low self-confidence, on the other hand, generally reject academic challenges and become less persistent in achieving success (Schunk & Mullen, 2012). In addition, teachers' adoption of approaches that reinforce students' trust in teaching and focus them on success contributes greatly to the learning process. It is thought that this motivation developed for learning will allow students to overcome the difficulties they encounter in the learning process and to participate more effectively in the teaching

process. When the studies conducted on this subject are examined (Ahmad, Ludin, Ekhsan, Rosmani & Ismail, 2012; Balcı & Çayır, 2017; Gyarmathy, Mahlerbe, Pichel, Stoyanov & Tartari, 2009; Hazoury, Oweini & Bahous, 2009; Ho, Lam & Au, 2001) it is observed that there is a need for more multisensory studies. In addition, it is observed that there is limited applied research on this and similar subjects in the field. For this reason, it is considered to conduct a study on multisensory supported learning in foreign language teaching, where students with special learning disabilities have great difficulty. The purpose of this study is to evaluate the effect of multisensory teaching in teaching English vocabulary (terms related to sports) as a foreign language to students with specific learning disabilities (dyslexia). In this context, the following question was sought.

- Is the multisensory teaching technique effective in teaching English vocabulary to children with specific learning disabilities?

3. Methodology

This section includes the research model, the study group, data collection and analysis.

Research model

In this study, the effect of the multisensory teaching method in teaching sports-related words about basketball in English to a student with a specific learning disability (dyslexia) was examined through a single subject design of which analysis reveals the situation of the case with in-depth detailed analyses.

This study is considered as a teamwork used to reduce a very wide research area reached as a result of detailed measurement and evaluation to an easily understandable and researchable form. In this study, the effect of the multisensory technique in teaching English vocabulary was aimed to be evaluated. This study employed a Single-Subject Experimental Design to evaluate the effectiveness of the intervention. The Independent Variable was the multisensory teaching program integrated with basketball-themed activities. The Dependent Variable was the participant's accuracy in identifying and pronouncing 15 targeted English basketball terms. The multisensory teaching technique, is a particularly popular teaching method for children who have learning differences such as Dyslexia or ADHD, or those with learning disabilities and also a great way to ensure that your teaching is inclusive, as it provides a variety of ways for children to access the learning, and does not rely on just reading, writing and listening alone. It involves using more than 2 senses out of auditory learning through sounds, hearing and listening, visual learning through seeing and watching, tactile learning through using our sense of touch, kinaesthetic learning through body movement or physical activity (this uses the proprioceptive and vestibular senses) and gustatory and olfactory learning through taste and smell. This multisensory technique has been adapted to the education systems of various countries and used with individuals with dyslexia (Mehrabi, Zarbakhsh, & Rahmani, 2014) aims to include the learner in learning

activities by using more than one sense (Magpuri-Lavell, Paige, Williams, Akins, & Cameron, 2014).

Participants

The criterion sampling method was used to determine the student in the study. Criterion sampling is the creation of the sample from people, events, objects or situations that have the characteristics determined in relation to the problem (Büyüköztürk et al., 2020). The student to be included in the study was expected to be diagnosed with a specific learning disability (dyslexia), to be taking a foreign language (English) course, to have a low grade point average for the English course, to have to learn English, not to have taken a systematic course on teaching English vocabulary before and to have the background information to give reactions to the teaching methods to be used in the study (following the instructions, giving appropriate responses and not having a receptive and expressive language problem). In the sample selection, a male student with dyslexia, a specific learning disability, was studied. The student is 10 years old at the fourth grade as an inclusive student. The alias (Efe) was used in accordance with the personal data protection and ethical rules regarding the student. Information about the student was obtained from the child himself (Efe), his mother, his grandfather, Efe's classroom teacher and his former special education teacher.

Data Collection

The data of this study was collected in accordance with the single subject design technique. Multisensory teaching techniques based on the combination of auditory, visual, tactile and kinesthetic were used in the study, and Sparks et al. (1992) showed that this technique not only increases academic success in students with learning disabilities, but also becomes effective in second language learning. Moreover, contemporary pedagogy based on neuroscience perceives this technique as a tool that accelerates the retention of school material and improves recall (Gosiewska Turek, 2020). For this reason, activities that allowed frequent repetition were planned in teaching sessions.

The tools used in the teaching process included criterion-dependent measurement tool for the evaluation of the teaching process (checklists indicating whether the student responded behaviourally and linguistically to the commands), cards with basketball-related terms (basketball equipment, body parts, court lines, warm-up moves, dribbling moves and shots) in English for the implementation process and picture cards containing basketball-related terms.

Planning the Teaching Process and Implementation: Before moving on to the implementation process, it was clear that Efe had a negative opinion about school and learning. In order to overcome this, the English course was selected as the primary target. Efe had previously requested that his family should provide private English lessons for him. The primary target was to teach basketball terms verbally in English. The visual, auditory

and kinesthetic senses would be used together through the multisensory technique where a large part of the course was taught in the target language English. In addition, movement-based activities were used to support Efe's learning and to create repetition opportunities. The issues to be considered in the research process were planned as follows by taking expert opinions and lesson plans were evaluated by two independent experts.

- Activities that would allow frequent repetition in teaching sessions were planned.
- In order to make it easier for the student to read, attention was paid to the fact that written materials were in large font size.
- Information was obtained about the student's family and social environment.
- Individualized lesson plans were prepared for each session with the spiral learning model.
- In the lessons, there were review sessions on previously covered topics and if necessary, retrospective review was done.
- Plenty of visuals and videos were used during the teaching process.
- In-class exercises were made fun with movements and mistakes were tolerated through positive/encouraging words.

One of the most important goals for this study is to change the dyslexic student's negative attitude towards himself and to help the child improve himself. Therefore, using plenty of social reinforcements, making the student talk about his goals, and chatting about basketball, about which the student was already motivated, were very important. In this context, it is aimed for the student to learn English in order to contribute to his future basketball career. It is thought that this situation would motivate him to make assignments in and out of class. The topics that formed the basis for teaching English to the student were basketball equipment, body parts, court lines, warm-up exercises, dribbling exercises and shots.

Implementation process: The treatment lasted for six weeks, one week for each topic. During this period, training was provided on six different topics for four days a week. For each lesson, care was taken to ensure that everything was said in English during the lessons and it was supported with facial expressions to facilitate student understanding. However, Turkish expressions were used to repeat the parts that the student could not understand. The first 40 minutes of the lesson were held in the classroom and the next 40 minutes on the basketball court. An English conversation was initiated under the name of "Daily Routine" at the beginning of each lesson. Attention was paid to asking the following basic questions during the conversation: "How are you?", "How was your day?", "What did you do today?", "What are you going to do tomorrow?" After receiving the answers, the student was asked to reciprocate the same questions one by one "Now, you ask me the same question." In the following weeks, this instruction decreased and the student was expected to ask questions on his own. In addition, the following questions were asked to support the teaching of basketball terms: "Have you watched any basketball game this week?" "Who won?" "Who

lost?" "Which basketball team were you supporting?" Then, the information covered in the previous lesson was reviewed. The dribbling movements taught in the previous lesson were asked with the following instructions: "You will start from the back line, run and dribble around the free-throw lane" (Here, the field lines, which were the instructional target in previous sessions, are intentionally used and reinforced.) "I will tell you a sentence and you will dribble while running." The session is completed by going over all of the dribbling commands below at least twice.

- 1) I am dribbling with two hands
- 2) I am dribbling with my right hand
- 3) I am dribbling with my left hand
- 4) I am dribbling between the legs
- 5) I am dribbling behind the back
- 6) I am doing a crossover dribble

If the student got it right, positive reinforcement was provided. If the student made a mistake, this was shown using verbal cues. Then, the topic to be covered that day was told. "Today, we're going to learn how to talk about different types of basketball shots. You will take your shots and write your score in your NBA notebook. Are you ready to learn?" The student was rewarded for taking shots and recording their scores in their notebook. After a positive response was received from the student, instruction started. "Let's start." The student watched the relevant videos one by one (free throw, lay up, dunk, jump shot, three pointer). By using the visual narration in each video, the student was not only taught the name of the shot but also how to make the shot, while also repeating the body parts in the video. After each video, the student was asked to make the relevant shot. "Please show me what you see in the video." While the student was making the shot, the teacher asked: "What are you doing?" Then the teacher said without waiting, "I am throwing a free shot." After watching each shooting video, the teacher asked each movement one by one and ensured that the student would repeat it simultaneously with him.

Setting: Teaching was planned in two separate environments. The lessons were first taught in the classroom to introduce the words to be taught with picture cards. The class was held one-on-one and face-to-face in a quiet classroom environment free of stimuli. The application process of the taught words was carried out one-on-one on the basketball court in the school gym.

Data analysis

After the six-week treatment was completed, data were entered into the criterion-dependent measurement tool and the interrater reliability forms and then were analysed and presented as graphics, and the observation and interview results were presented as the qualitative data

in the findings section. Data were analyzed using visual inspection of the graphic displays. Following JESS criteria, the analysis focused on changes in level, trend, and variability between the baseline and intervention phases. Additionally, the Percentage of Non-overlapping Data (PND) was calculated to determine the treatment's effect size.

In this section, data obtained within a single-subject design are presented through descriptive and visual analysis in terms of accuracy rates, trends, level changes, and variability.

Baseline Phase

At least three baseline sessions were conducted for each instructional objective. Baseline data indicate that the participant's performance on target words was low and inconsistent. Correct response rates ranged from 0% to 20%. These findings suggest that target behaviors were at a limited level prior to the intervention.

Intervention Phase

With the implementation of the multisensory teaching intervention, significant increases were observed across all instructional objectives.

- Body parts: The correct response rate, which was approximately 11% at the baseline level, reached 100% by the end of the intervention.
- Warm-up exercises: Performance, which was 0% at the baseline, rose to an average of 95% by the end of the intervention.
- Expressing basketball terms in English: Increased from 17% to 98.75%.
- Court lines: Increased from 0% to 87.25%.
- Dribbling movements: Reached 100% from 0%.
- Shot types: Increased from 20% to 85%.

An immediate level change and an increasing trend were observed in all target behaviors following the intervention. The data indicate a consistent learning process, showing low variability during the intervention.

Generalization and Follow-up Findings

During follow-up sessions, it was observed that the participant retained the words they had learned and was able to use them in different contexts. The participant was able to use the target words not only in the instructional setting but also in everyday conversations and various social interactions. This demonstrates the generalizability and durability of learning.

Measurement and Scoring

A criterion-referenced checklist was used for data collection. A "correct response" was defined as the student accurately identifying the visual cue and providing the correct English pronunciation within 5 seconds. To ensure Inter-observer Reliability, 30% of the sessions

were independently scored by a second researcher, resulting in a 95% agreement rate. Procedural Fidelity was maintained by following a standardized 80-minute lesson protocol (40 minutes of classroom multisensory tasks and 40 minutes of on-court kinesthetic application).

Overall Evaluation

The increase in performance from the 0–20% range at the baseline to the 85–100% range following the intervention indicates that the multisensory teaching approach has a strong impact on target behaviors.

Visual analysis results reveal a clear separation between the baseline and intervention phases, indicating a strong intervention effect. These findings suggest that the multisensory teaching method is an effective approach for supporting foreign language vocabulary acquisition in individuals with specific learning difficulties.

4. Finding

A total of 6 instructional objectives were determined, and at least 3 initial data were taken for each instructional objective. While the evaluation of the teaching session was made at the end of each lesson, a probe session was also held at the beginning of each lesson for the subject or subjects covered in the previous lessons. At least 3 probe session data were taken outside the teaching session.

When Graph 1 is examined, Efe's correct behavior development is noticed regarding body parts and warm-up movements while it was 11% for body parts, it showed a hundred percent development at the end of the application process. While the initial level data for warm-up was zero, it is seen that the average development was 95% at the end of the application process. These results show us that the presentation of the subject in the student's field of interest with the multisensory teaching technique is effective in teaching English.

When we examine Graph 2, while the level of "saying basketball terms in English when asked in English" for basketball terms was at 17% at the beginning, it became 98.75% at the end of the application process. Secondly, while the initial level for "saying basketball court lines correctly when asked in English" was zero, it was seen that it was 87.25% accurate as a result of the application. In the third stage, it was seen that he could say "basketball dribbling moves" at a rate of 100% at the beginning level, while he did not know them at all at the beginning level. In the fourth and final stage; while he said "basketball shot types" at a rate of 20% correctly at the beginning level, it was seen that he named them 85% correctly at the end of the teaching sessions. These results show that a success above the 80% accuracy rate expected before the application was achieved. According to the analysis results, while the student's initial success rate varied between 0-20%, these rates increased to over 80% at the end of the teaching process.

5. Discussion

This finding shows the positive effect of the multisensory teaching technique on learning performance. It has been observed that visual materials, video-supported explanations and practical learning activities on the basketball court strengthen the student's ability to both recognize and use in context. In addition, the student's ability to use the words he has learned in extracurricular conversations and daily expressions reveals the functionality of learning. In this context, positive reinforcement and individual feedback increase his motivation and support his development of a positive attitude towards learning (Humphrey & Mullins, 2002). This process, enhanced through teacher support, also positively affected the student's self-efficacy perception. (Schunk, 2003). The data obtained during the six-week training process show that the student made significant progress in the vocabulary learning process and his motivation increased. While the student's vocabulary knowledge at the beginning level was quite limited, significant improvements were observed in word recognition and recall skills with the application of multisensory teaching techniques. This finding is consistent with previous studies showing that techniques that use more than one sense at a time are effective in the learning processes of individuals with dyslexia (Kormos & Smith, 2012; Nijakowska, 2013). The multisensory teaching technique provides a deeper understanding of concepts thanks to the careful selection of alternative senses according to the tasks designed for the student and makes learning more accessible for students with learning disabilities (Renelle & Jones, 2022).

The techniques that the student benefited the most during vocabulary learning included visual materials and movement-based activities. The student's vocabulary learning through basketball terms coincides with the literature emphasizing the importance of teaching methods based on personal interests in increasing the academic success of individuals interested in sports (Algrni, 2020; Korkmaz & Karatepe, 2018). In addition, the student's active role in the learning process and constant feedback contributed to maintaining motivation (Schunk & Mullen, 2012). Another important finding of the study is that the student's ability to use the words he has learned not only in the classroom environment but also in different contexts has improved. This shows that the student has gained the ability to generalize the information he has learned. In particular, while the positive effects of multisensory materials and activities used in the teaching process on the permanence of learning are also supported in the literature (Gosiewska Turek, 2020), it is stated that learning difficulties that are not addressed with appropriate educational measures in a timely manner can become more serious and the achievement gap between students with foreign language learning difficulties and their peers can gradually widen. (Ivančević Otanjac, 2016; Ortiz, 2008). The increase in student motivation is directly related to teacher guidance and positive reinforcement. Effective teachers select and use the most appropriate teaching methods and techniques for their students' needs (Obaid, 2013). Humphrey and

Mullins (2002) emphasize the critical role of teachers in student motivation and self-confidence development. The student's sense of self-efficacy is an important factor affecting task selection, effort, resistance and success. (Schunk, 2003). The results of this study also show that the positive approach of the teacher and individualized teaching plans suitable for the student have a significant effect in terms of increasing the active participation of the student in the learning process and thus contributing to the sense of self-efficacy.

Finally, the study findings support the idea that multisensory teaching techniques are an effective strategy for students with dyslexia in the foreign language learning process. These findings are also in line with previous studies indicating that more multisensory techniques should be adopted in foreign language teaching for students with dyslexia (Magpuri-Lavell et al., 2014; Sparks, Ganschow & Javorsky, 1998). Studies on the effectiveness of multisensory techniques emphasize the need for teachers to creatively use a variety of multisensory tasks that provide multiple ways of representing the material, allow students to express the learned content in different ways, and provide more opportunities for students to participate in learning. (Mills, 2018) Therefore, it is of great importance to employ multisensory teaching tasks in foreign language education especially for the students with specific learning disabilities.

The significant improvement in the participant's vocabulary acquisition aligns with the theoretical framework proposed by Nijakowska (2010), who asserts that students with dyslexia require explicit, structured, and multisensory involvement to overcome phonological processing deficits. By engaging visual, auditory, and kinesthetic pathways simultaneously, the intervention provided the necessary scaffolding that traditional, monosensory instruction often lacks. This is further supported by Kormos and Smith (2012), who emphasize that for learners with Specific Learning Disabilities (SLD), multisensory techniques are not merely supplementary but essential for bypassing the cognitive bottlenecks associated with foreign language word retention.

The transition from a stable baseline to a high-performance intervention phase highlights the critical role of situational interest in academic engagement. According to the Four-Phase Model of Interest Development (Hidi & Renninger, 2006), incorporating a learner's pre-existing interest—in this case, basketball—functions as a powerful motivational catalyst. This interest-driven approach likely reduced the participant's cognitive load and anxiety, allowing for more effective encoding of new lexical items. As noted by Schunk and Mullen (2012), when learners perceive a task as personally relevant, their self-efficacy and persistence increase, which was clearly observed in Efe's consistent 100% accuracy during the final weeks of the study.

The findings of this study are consistent with recent empirical evidence in the field of special education. Similar to the results reported by Algrni (2020), who demonstrated the efficacy of multisensory tools in teaching English vocabulary to students with LD, this

research confirms that kinesthetic reinforcement (on-court activities) leads to higher retention rates compared to classroom-only instruction. Furthermore, the success of this 6-week intervention mirrors the findings of Nijakowska (2013), reinforcing the conclusion that tailored, multisensory programs can effectively bridge the achievement gap for dyslexic students in foreign language contexts.

6. Conclusion, Recommendations and Limitations

This study examined the effectiveness of multisensory teaching techniques in the English vocabulary learning process of a student with specific learning disabilities (dyslexia). At the end of the six-week teaching process, it was determined that the student made improvements in both vocabulary learning and self-confidence. In the criterion-dependent measurement tool used, although the student's initial data success rates were low, it was seen that the educational objectives were achieved to the specified extent in the evaluations at the end of the teaching process and in the probe sessions. This finding supports the fact that multisensory teaching is an effective intervention tool for individuals with dyslexia (Hazaymeh & Khasawneh, 2025).

In line with the findings of the study, the use of content related to the student's personal interests (e.g. basketball) increased their motivation to learn. This situation once again reveals the importance of individualized teaching plans in the learning process (Altındağ Kumaş & Sardohan Yıldırım, 2021). The visual materials, video-supported narrations and movement-based activities used in the teaching process encouraged the active participation of the student and made the learning process fun and meaningful (Sezgin, Bozkurt, Yılmaz & Van der Linden, 2018).

The student's ability to use the learned expressions in different contexts shows that a functional language learning has been taking place. In this context, this approach enables students to achieve meaningful and permanent learning with its dual-focused structure where not only the language but also the content is learned to be used effectively not only in the classroom but also in different cognitive contexts (Coyle, Hood & Marsh, 2010).

In this context, in foreign language teaching programs, for students with dyslexia;

- Multisensory teaching techniques, materials suitable for different learning styles and individualized content should be used.
- Movement-based and student-centered learning strategies should be considered as an effective tool in increasing motivation.
- Individual teaching plans prepared according to the student's interests support not only academic success but also the development of self-confidence.
- Multisensory teaching techniques and effective strategies for dyslexia should be included in teacher education programs.

In conclusion, this study shows that multisensory teaching has positive effects on both cognitive and affective areas in foreign language learning of students diagnosed with dyslexia. These findings indicate that policies regarding foreign language education of individuals with learning difficulties should be restructured and teachers should be supported in this regard.

The study also provides strong evidence regarding the durability and generalizability of learning by demonstrating that learned words can be retained during follow-up sessions and used in different contexts. The use of content based on the student's area of interest (basketball) and the combined presentation of multisensory materials supported learning from both cognitive and affective perspectives.

These findings indicate that a multisensory teaching approach is an effective and feasible method for teaching foreign language vocabulary to individuals with dyslexia.

As to recommendations, they are grouped as practical and future research below:

Practical Recommendations

- Teachers should systematically incorporate multisensory approaches—combining visual, auditory, and kinesthetic elements—into instructional processes for students with specific learning difficulties.
- Using content based on students' interests and needs (e.g., sports-based materials) can increase motivation and engagement.
- Gamification, social reinforcements, and continuous feedback mechanisms should be planned as supportive elements of the learning process.
- In foreign language instruction, particularly in vocabulary teaching, meaningful contexts and practical activities should be prioritized.

Recommendations for Future Research

- Future studies should be conducted with larger samples and across different age groups to enhance the generalizability of findings.
- Longer-term intervention and follow-up studies should be conducted to examine the sustainability of learning over the long term.
- Experimental studies comparing different teaching methods (e.g., purely visual or purely auditory approaches) with multisensory instruction could be conducted.
- Mixed-methods studies combining quantitative analyses (e.g., effect size measures) with single-subject research methods are recommended.

The limitations of the study can be grouped under three subheadings:

1. **Limited participant group:** This study employs only one participant. Therefore, the findings may not fully reflect the experiences of the students with learning disabilities in general.

2. Diversity of disability types: During the research process, since one participant was involved in the study, there was no diversity in terms of age and gender.
3. Language and Communication Limitations: As the target vocabulary consisted of only basketball related terms, the language and communication was limited to only basketball related topics.

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Appendices

Graph 1

Correct behavior scores



Graph 2

Correct behavioral responses

