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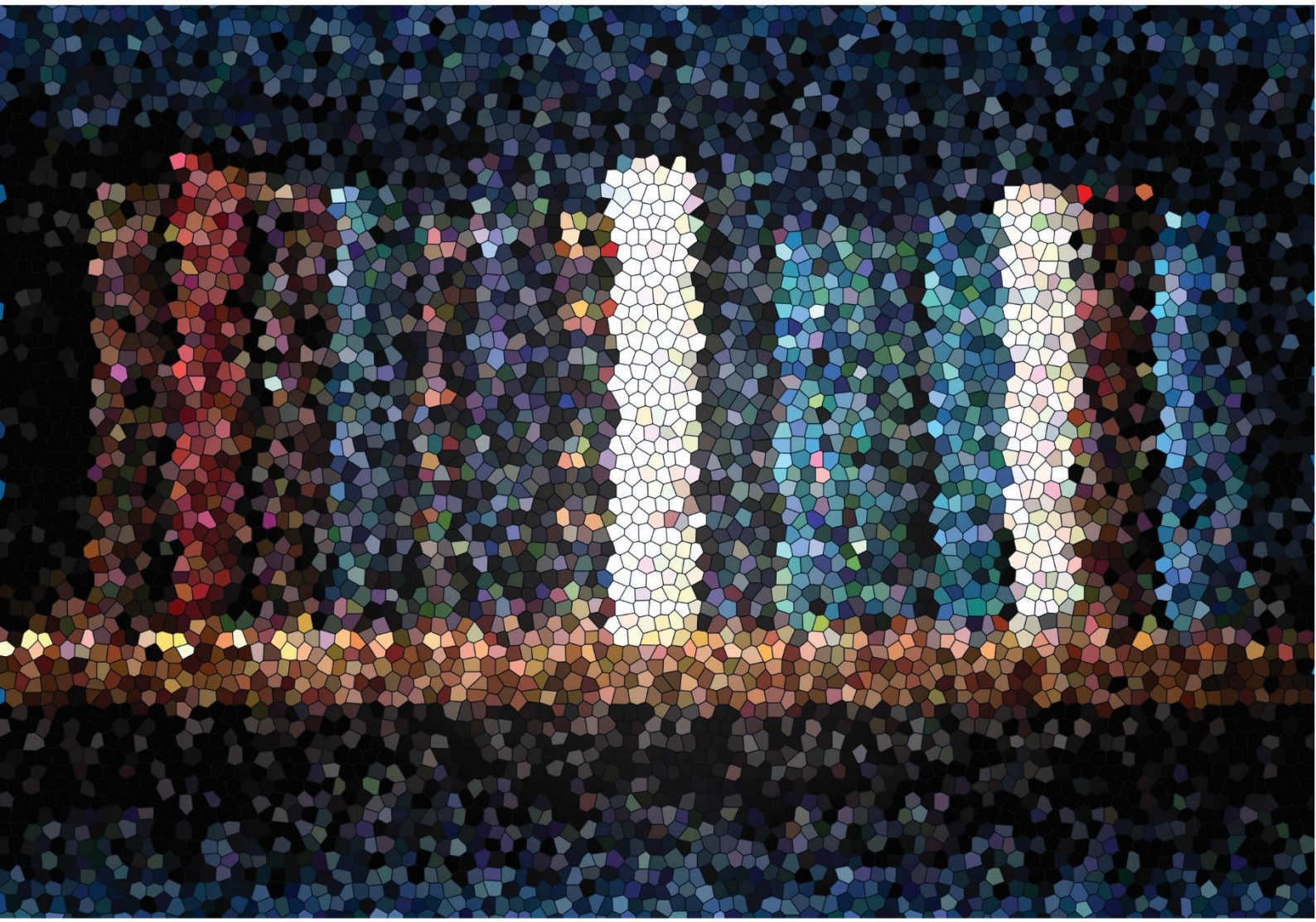

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Literature Review

Leadership in Times of Change: A Systematic Review of Principals' Instructional Strategies for Teacher Professional Development

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Abstract

This systematic review, conducted in accordance with PRISMA guidelines, examines how instructional leadership practices influence teachers' decisions to engage in professional development across diverse educational contexts during and after the COVID-19 pandemic. To identify relevant studies, we searched the Web of Science, Scopus, Sage, and Springer databases. We included only peer-reviewed scientific articles published in English between 2020 and 2024. Of the total of 1497 records identified, 24 met the eligibility criteria. Effective instructional leadership practices, supported by educational policies, contribute to improving teaching and increasing teachers' engagement, self-confidence, self-efficacy, and well-being. The study highlights teachers' professional development as a continuous approach that requires permanent support from school principals. Instructional leadership plays a strategic role in creating an organizational culture oriented towards collaboration, learning and innovation.

Keywords:
educational climate, instructional leadership, teacher expertise, teacher professional development

1. Introduction

The quality of the education system represents the basis for the integral development of society, being supported by various interconnected factors, such as the teaching skills of teachers, leadership practices, and the school environment (Day & Sammons, 2016). Recent improvement efforts increasingly emphasize principals' instructional leadership as a lever for school performance, particularly through teachers' professional development (Liu et al., 2022). According to the OECD (2021), accelerated changes in society determine the need for teacher training as promoters of critical thinking, facilitators of the learning process and organizers of inclusive climates. Although the literature underscores the importance of instructional leadership, important uncertainties remain about which intervention components are most effective, which contextual conditions constrain or enable their impact, and how to adapt these practices to individual schools (Klar et al., 2020).

2. Theoretical foundation

2.1. Instructional leadership

In research on effective schools, educational leadership is considered a key factor (Duke, 1987). It gained prominence in 1980s educational theory linked to reform agendas focused on efficiency and accountability (Hallinger & Murphy, 1985). The concept has evolved from a focus on resource management to approaches that integrate strategic planning with direct pedagogical support, aligned with contemporary standards (Suh, 2024). Behaviors and skills associated with this form of leadership include managing curriculum and instruction, goal setting, supervising and evaluating teaching, ensuring staff professional development, managing resources, promoting a positive school climate, and cultivating high expectations for achievement (Duke, 1987). Research on school effectiveness has long emphasized the principal's role in initiating and sustaining improvement (Hallinger & Murphy, 1987).

Thien & Liu (2024) note that leaders who observe classroom instruction, provide ongoing feedback to teachers, and support peer collaboration can significantly enhance teaching quality. Principals' supportive supervision has been linked to increased job satisfaction, enhanced teacher self-efficacy, and improved student achievement (Hattie & Timperley, 2007). Similarly, Liou & Dali (2014) argue that fostering an open, collaborative climate, involving teachers in decision-making, and building trust by granting autonomy are important practices for strengthening teachers' professional development.

2.2. Teachers' professional development

The process of continuous improvement of skills and knowledge during the teaching career is called

professional development (Bolam, 2002). This is an approach through which the teacher builds and affirms his professional identity, transforming tacit knowledge into explicit knowledge. At the same time, within his area of expertise, professional development is seen as a process of assuming responsibility both professionally and personally (Berliner, 2001). Continuous professional development is how teachers improve their teaching, pedagogical knowledge, manage the classroom more effectively, and align with global educational norms (Olatunde-Aiyedun & Ogunode, 2021).

Eraut (1994, p.20) considers that "there are three major contexts in which professional knowledge is acquired: the academic context, the context of institutional discussions about politics and the practice itself". Given systemic changes and emerging challenges, teachers must continually evolve and adapt their methods; continuous professional development is therefore a lifelong journey (Olatunde-Aiyedun & Ogunode, 2021).

2.3. The link between instructional leadership and teachers' professional development

Principal leadership influences teachers' beliefs, motivation, engagement, self-esteem, performance, and interactions (Bellibaş & Liu, 2017, 2018; Leithwood et al., 2019). These relationships do not follow a linear trajectory, but are shaped by contextual factors, which requires a detailed theoretical explanation of how leadership supports professional development. Through a systematic analysis, Roberto (2023) highlights that principals affect teachers' professional development, but this influence is conditioned by several factors: educational policies, the balance between administrative tasks and teaching priorities, deficiencies in principal training, the prevalence of classroom observation practices, and trust in the professional development process. This perspective is also supported by Dilekçi & Limon (2020), who show that principals' instructional leadership influences teachers' professional engagement not directly, but through subjective well-being, highlighting the importance of the climate created by the leader to support motivation, commitment, and development.

In contexts where institutional support is limited, as is the case in schools in the Philippines, the relationship between leadership and professional development manifests itself mainly through mechanisms such as constructive feedback, collaboration, and opportunities for continuous learning (Kilag & Sasan, 2023). Quality relationships between teachers and principals, based on trust, open communication, and mutual respect, are essential to support professional development. Continuing education opportunities, such as workshops, mentoring, and coaching sessions, are also necessary. These findings are important for principals and policymakers to promote effective teacher professional development.

2.4. The present study

The concern in recent years to improve education has increasingly highlighted the role of instructional leadership in the professional development of teachers, and at the same time, in increasing school performance (Nguyen et al., 2020; Liu et al., 2022).

The existing literature presents several systematic reviews that synthesize studies published up to and including 2019. Notable examples include Kirsten (2020), a systematic review of research on teacher professional development as a policy tool, and Roberto (2023), on the pedagogical leadership of school managers and teacher professional development. However, given the significant changes in the recent period (2020–2024), including the impact of the COVID-19 pandemic and the accelerated digitalization of education, an update of these analyses is necessary.

Thus, the aim of this systematic review is to integrate findings from research published between 2020 and 2024 on how principals' instructional leadership relates to teacher professional development, highlighting the factors that influence this connection.

The research questions were formulated according to the PICO model, a tool frequently used in systematic reviews. This model highlights four important components in research: population, intervention, comparison, results. Based on these, we aim to find the answers to the following questions:

RQ1: How do instructional leadership practices influence the professional development of teachers in various schools during 2020–2024?

RQ2: What types of instructional leadership strategies or interventions prove to be effective in supporting the continuing training of teachers in a contemporary educational context?

RQ3: What social, organizational, contextual, and individual factors influence the impact of school principals on teachers' professional development?

3. Methodology

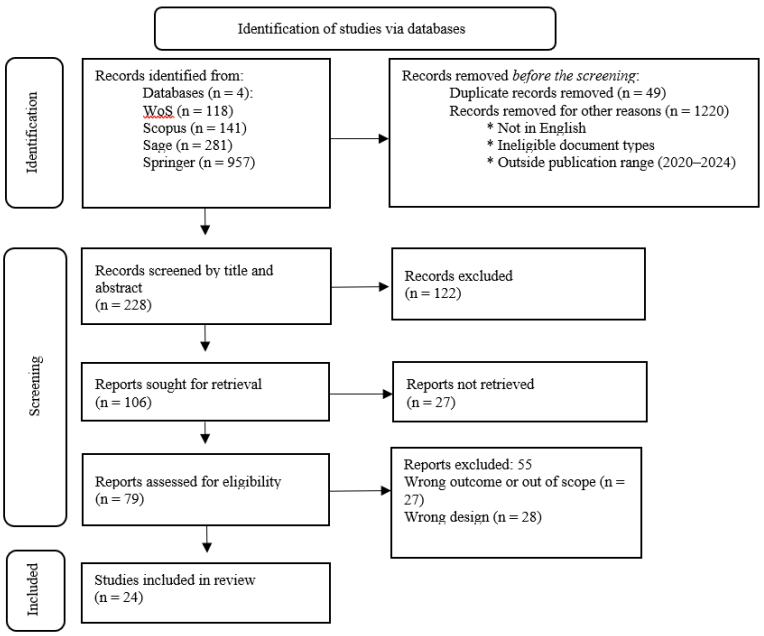
This systematic review was prepared according to the PRISMA protocol (Preferred Reporting Items for Systematic reviews and Meta-Analyses; Page et al., 2021). VOSviewer 1.6.20 was used to perform the bibliometric analysis.

3.1. Literature search

The initial literature search targeted 4 electronic databases. We selected Web of Science and Scopus as primary sources due to their international, multidisciplinary coverage and citation tracking. We supplemented these with Sage and Springer for targeted searches in key educational leadership journals. The same search strategy was applied in all databases and focused on the following key terms: "instructional leadership" AND "teacher" AND "professional development". The search has been restricted to the *article title, abstract, keywords* fields. In the identification stage, 1497 records were found. Before screening, we introduced specific criteria: publication period (*2020–2024),* language used (*English*) and type of scientific reports (*peer reviewed journal articles*). Thus, records that do not comply with those criteria (1220) and duplicates (49) were excluded. The flow diagram of the study selection process (following PRISMA) is shown in Figure 1.

Figure 1

Prisma Diagram (Page et al., 2021)



3.2. Study selection

After removing duplicates, all selected studies (228) were analyzed on the basis of title and abstract, excluding 122. Subsequently, out of the 106 recordings, 27 were excluded because the full text was not accessible. Retrieved full-text studies were selected for the eligibility stage (79) and evaluated based on the inclusion and exclusion criteria described below.

Inclusion criteria: peer-reviewed journal articles (English, 2020–2024), quantitative or mixed-methods with quantitative results, conducted in pre-university settings (pre-primary to upper-secondary) with in-service teachers and/or principals, explicitly measuring instructional leadership and teacher professional development.

Exclusion criteria: qualitative studies, meta-analyses or systematic reviews; studies that examine general trends in leadership associated with school environments, teacher evaluation, or student outcomes; studies that present teacher certification programs in specific areas or training programs for principals; studies that measure various teacher capacities and behaviors (e.g., engagement, collaboration, leadership, educational accountability, self-efficacy, motivation, digital integration strategies) without focusing on the principal instructional leadership.

In total, 24 reports that met the eligibility criteria were included in the systematic review. These articles included a total of 46,214 participating teachers and principals, plus 1000 students. The summary of the selected articles is illustrated in Table 1 (Appendix A), where we list the database, authors, year of publication, title, country/region, aim, methods and main results. These studies highlight the role of instructional leadership in supporting teachers, strengthening self-efficacy and promoting professional development in various educational contexts, aspects that are further detailed in the results and discussion section.

4. Results and discussions

The literature analysis was carried out on a sample of articles selected from the main scientific databases. As can be seen in Figure 2, most of the articles come from Web of Science (46%) and Scopus (33%), followed by Sage (13%) and Springer (8%). This distribution reflects both the international recognition of the topic and the relevance of the topic to the global scientific community.

In terms of publication period, Figure 3 illustrates the number of articles published annually between 2020 and 2024. In 2020, six studies were identified, originating from Singapore, Rwanda, Malaysia, Japan,

South Korea, Kiribati, and Germany. In 2021, three articles were included (Kosovo, Italy, and China), while in 2022 five articles were identified, including two from Indonesia, alongside studies from China (Shandong Province), Switzerland, and the USA (Boston). In 2023, four articles were selected (Kuwait, China, Chile, and Hong Kong). In 2024 six studies were identified, from Ghana, Nigeria, the Czech Republic, China, and Malaysia.

Figure 2

Distributions of articles in databases

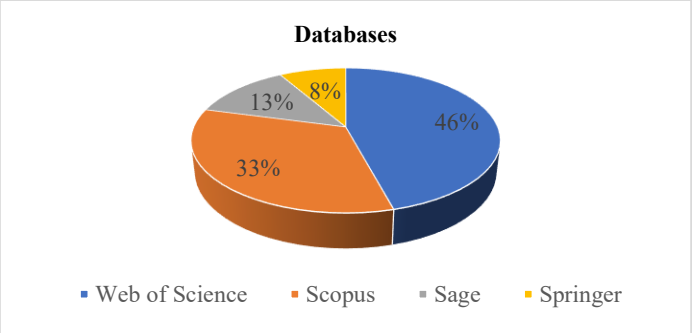


Figure 3

Distribution of articles by year (2020–2024)

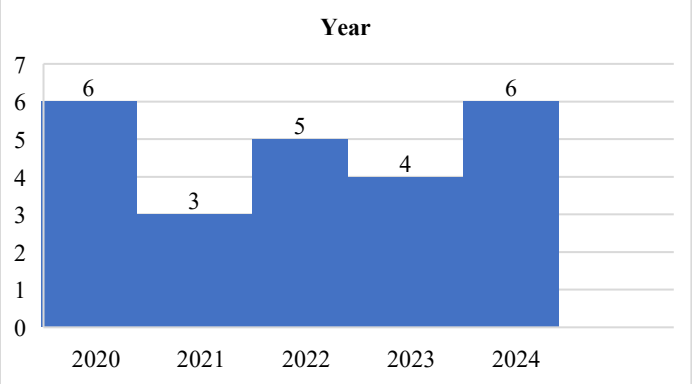


Figure 4

Distribution of articles by geographical area

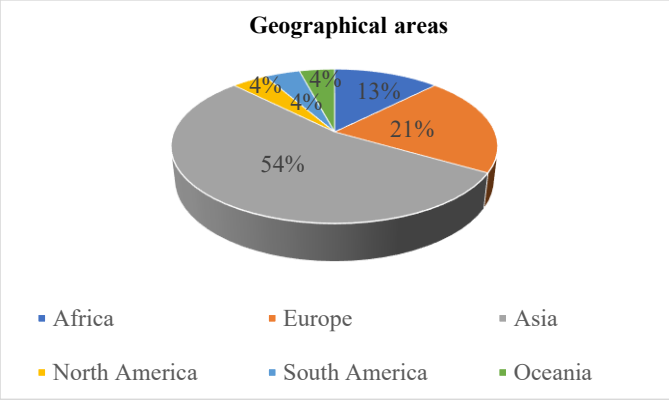
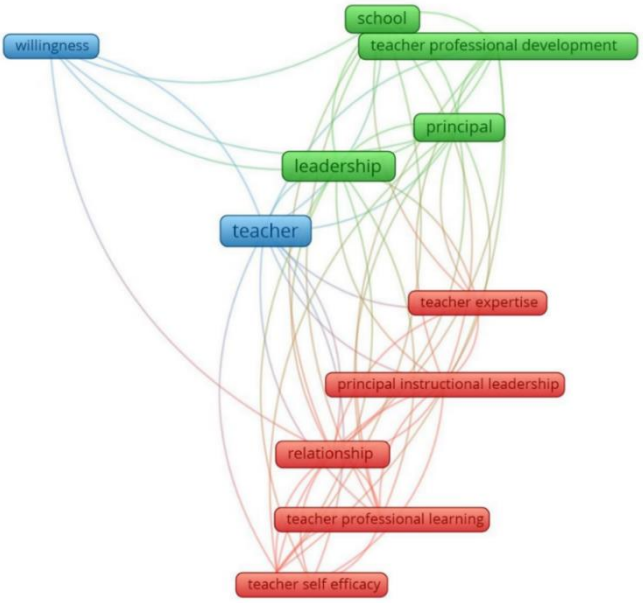


Figure 4 illustrates the distribution of articles according to broader geographical areas: Africa (3), Asia (13), North America (1), South America (1), and Oceania (1). Compared to the country-level distribution shown previously, this figure provides a more comprehensive overview of how research on instructional leadership and teacher professional development is spread across regions.

To highlight the keywords in the selected articles and the links between them, we generated a bibliometric map using the scientific software VOSviewer. In order to obtain a result that illustrates the relevant concepts, we included certain constraints. Thus, we reduced the number of occurrences of the keywords to 12. Subsequently, the software generated a map with 3 colored clusters, which represent groups of elements, based on co-occurrence or similarity in the data set (van Eck & Waltman, 2014). The bibliometric analysis is illustrated in Figure 5.

Figure 5

Bibliometric map of articles based on keywords



The bibliometric map highlights how instructional leadership practices, professional relationships and organizational or individual factors influence teachers' professional development. At the center of the map lies the first cluster, where the "teacher" is positioned, directly connected to both school leadership and "willingness", emphasizing the role of motivation in continuous training.

The second cluster groups concepts such as "leadership", "principal", "school", and "teacher professional development", showing that the organizational environment and school management are essential for the professional development of teachers. This provides insight into the first research question (RQ1), which investigates the influence of

instructional leadership on teacher development in different schools.

The third cluster comprises the terms "relationship," "teacher self-efficacy," "teacher professional learning," "teacher expertise," and "principal instructional leadership." It operationalizes research question 2 (RQ2) by linking principals' instructional leadership to teachers' learning and expertise, while underscoring the mediating role of relational trust and teacher self-efficacy in professional progression (e.g., through classroom observation with feedback, collaborative professional learning, and mentoring/coaching).

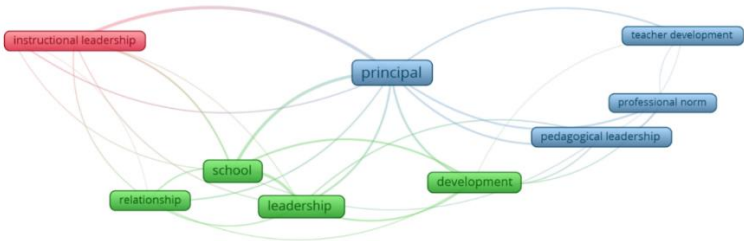
The multiple links between these clusters highlight the external and individual factors (RQ3) that influence the impact of the school principal on teacher development: professional relationships, school culture, principal leadership, but also individual teacher motivation and expertise. The map shows that the professional development of teachers is the result of a complex interaction between leadership, organizational context and personal factors.

4.1. A comparative perspective on conceptual evolution

To highlight the conceptual evolution, we also generated a bibliometric map (Figure 6) based on the articles included in the systematic analysis conducted by Roberto (2023), covering the period 2010–2019), which allows a comparison with the current analysis (2020–2024).

Figure 6

Bibliometric map based on the systematic review by Roberto (2023)



The analysis of the two periods highlights that teacher professional development has evolved from norm-based structures to dynamic structures, which emphasize the importance of factors that motivate teachers to progress in their careers. The 2010–2019 map reflects connections between concepts such as "teacher development", "professional norm" and types of leadership ("pedagogical", "instructional") that indicate formal coordination and the role of the principal as a central authority. The psychological dimensions of teachers are absent, while professional development is marked by more general terms. In contrast, the 2020–2024 map introduces concepts that reshape educational leadership and provide new connections. "Teacher self-efficacy" is recognized as important in achieving satisfactory teaching outcomes and influencing classroom performance (Tschannen-Moran & Hoy, 2001; Bellibaș & Liu, 2017). At the same time, supporting the quality of the teaching process requires "teacher professional learning" which involves engaging in formal and informal learning activities to improve practices (Kwakman, 1998) and increase teaching expertise, being a fundamental objective of career sustainability (Lin et. al, 2005). The need to improve teachers' professional competence has become even more accentuated as a result of the educational transformation caused by COVID-19 pandemic. In this context, an essential construct has emerged: "willingness", which illustrates teachers' own initiative to address changes and stimulate professionalism (Herawati et al., 2022). These concepts indicate that, in recent years, educational research has increasingly focused on the teacher as an active agent of change.

4.2. Findings by research questions

The findings are structured into three thematic areas, each reflecting perspectives on the previously formulated research questions.

RQ1 – influences of instructional leadership on the professional development of teachers in various schools during 2020–2024

Instructional leadership has multiple influences on teachers' professional development (He et al., 2024; Krasniqi, 2021; Herawati et al., 2022; Volante et al., 2023). Internationally, evidence indicates that instructional leadership is considered a predictor of teachers' participation in collaborative, mentoring, and coaching activities. This fosters a climate conducive to continuous learning, both individual and collective (Kim & Lee, 2020). In Kiribati, Owen (2020) demonstrates that strategies supported by instructional leadership and educational policies, such as the formation of teacher learning groups, ongoing coaching, and monitoring student achievement, can optimize the skills of school leaders, as well as the capabilities of teachers.

Principals have a central role in supporting, advising, and encouraging teachers to participate in collaborative learning activities, which leads to increased professionalism and improved teaching

practices (Krasniqi, 2021). Instructional actions encourage collaboration between teachers (Alazmi & Hammad, 2023; Hua et al., 2024), help them focus on students' learning and increase teachers' confidence in their own abilities (Amzat et al., 2022; Ansaah et al., 2024). Thus, the high level of self-efficacy is determined by the clear setting and communication of school objectives by the principal, the supervision and evaluation of the training process, the constant monitoring of students' progress, and the fostering of professional development (Xie et al., 2022).

Herawati et al. (2022) emphasize the positive influence of instructional leadership on teachers' professional competences, but also on their willingness to adapt to new educational changes, such as digital learning. In a study conducted in Singapore, Nguyen et al. (2020) mention the existence of a positive association between creating a positive educational climate, promoting professional development and increasing teaching skills. Instructional leadership practices are significant predictors for four key competencies: pedagogical, curricular, knowledge of student learning, and assessment. The effects of instructional leadership are largely mediated by the professional agency of teachers (Li et al., 2023), but also by the school climate based on trust and collaboration (Hua et al., 2024). Through the favorable climate created by the principals, teachers become more autonomous and involved in their own professional development. Similarly, Meng & Chang (2024) highlight in a study conducted in rural schools in China, that high perceptions of instructional leadership in school not only boost teachers' didactic expertise, but also increase their level of job satisfaction and well-being. Instructional leadership acts as a catalyst for teachers' commitment at the individual level (To et al, 2023) and their motivation towards their own training.

On the other hand, Straková & Simonová (2024) state that the lack of instructional leadership and support from the school manager increases the likelihood that teachers will not advance professionally and give up their teaching careers. In schools where the principal recognizes the work of teachers, provides support and is responsibly involved in continuous training, there is a higher tendency of teachers to remain in the profession. Also, teachers who perceive leadership as open, supportive, and learning-oriented are more willing to engage dynamically in educational innovation initiatives (Rechsteiner et al., 2022).

Schools need to transform into active learning institutions through structural and mindset changes. In high-performing primary schools in Malaysia, the principal' involvement and active presence promotes a culture of continuous evaluation and reflection. By guiding, motivating, and setting a clear vision, leaders directly influence teachers' participation in professional development and collective learning activities (Hui & Singh, 2020).

RQ2 – types of instructional leadership strategies or interventions effective in supporting the continuous training of teachers in a contemporary educational context

Recent studies reviewed show that effective leadership practices improve teaching while encouraging teacher engagement and collaboration. According to Sibomana (2020), these include: defining and explicitly communicating school goals, planning curriculum in cooperation with teachers, supervising the training process through classroom observations and constructive feedback, providing teaching resources, and supporting engagement in professional development activities. To support professional development, it is necessary to clearly identify training needs and plan specific activities, providing real access to both internal and external learning opportunities. Other strategies that have been shown to be effective in this process are empowering teachers to organize peer training activities and informal mentoring between junior and experienced teachers (Nguyen et al., 2020; Krasniqi, 2021). Also, the active involvement of principals in promoting modern technologies and innovative teaching methods contributes significantly to teachers' professional progress (Paletta et al., 2021; Huang et al., 2021).

Building professional learning communities and real collaboration among teachers are the foundations of professionalization in education. Collective activities, such as workshops, study groups, coaching, and the exchange of constructive feedback, facilitate reflection on teaching practices and continuous improvement of teaching (Volante et al., 2023; Kraft & Christian, 2022; Herawati et al., 2022). Creating a climate of trust and mutual support, in which teachers feel safe to collaborate and share practices, is a determinant of professional expertise (Li et al., 2023; Hua et al., 2024). Effective leadership, in this sense, is adaptive, but relies on participatory and instructive practices: principals involve teachers in educational decision-making, observe classrooms and provide formative feedback, facilitate professional learning

communities, and co-design continuous development activities. These behaviors are associated with a collaborative culture, greater teacher autonomy, motivation, and, ultimately, innovation in teaching and learning (Krasniqi, 2021; Hui & Singh, 2020; Klein & Bronnert-Härle, 2020). A key element in instructional leadership is the frequent observation of classroom activity, followed by specific and constructive feedback, which encourages teachers' reflection and self-evaluation. Such practices lead to significant improvements in teaching methods and an increase in educational performance (Kraft & Christian, 2022; Kim & Lee, 2020).

RQ3 – social, organizational, contextual, and individual factors influencing the impact of school principals on teachers' professional development

Educational leadership and teachers' professional development are influenced by multiple interconnected factors.

Social factors. Good relationships with peers, mutual support, and trust within the team make teachers more open to exchanging ideas, participating in training activities, and sharing experiences (Amzat et al., 2022; He et al., 2024). Paletta et al. (2021) demonstrate that where there is a positive climate and a collaborative culture, innovation in education increases. In China, teacher mentoring is a long-standing practice in which less experienced teachers benefit from the collaboration and expertise of their more experienced colleagues (Xie et al., 2022).

In addition, community and parent involvement can support or, conversely, complicated school life (Krasniqi, 2021; Straková & Simonová, 2024). When teachers feel valued and supported not only by peers, but also by parents and students, their motivation increases (Li et al., 2023; Meng & Chang, 2024).

Organizational factors. Teachers' continuous professional development varies depending on organizational culture, principals' involvement in coordinating specific activities (Amzat et al., 2022; Hui & Singh, 2020), professional learning communities, leadership support, and constructive feedback (Volante et al., 2023; Hui & Singh, 2020). The surrounding political environment shapes the freedom of action of principals. In Singapore, the centralized system limits the independence of managers, but they can influence the vision and organizational climate (Paletta et al., 2021). In private schools, principals have greater autonomy and are more involved in educational leadership than in public schools, where administrative duties predominate (Ansaah et al., 2024). In these contexts, managerial support, culture, school structures, resources, and available time are essential for professional development, while the experience and skills of the principal influence the change process (Krasniqi, 2021). If the school has a rigid culture, with few resources or time for training, teachers' confidence in their own abilities decreases (Krasniqi, 2021; Herawati et al., 2022).

Contextual factors. Socioeconomic factors, educational policies, the degree of centralization, and available resources significantly influence professional development (Amzat et al., 2022; Paletta et al., 2021). For example, in Singapore or Rwanda, centralized systems limit principal autonomy but emphasize instructional leadership as a solution to resource shortages (Paletta et al., 2021; Sibomana, 2020). By contrast, In Kosovo, education policies promote collaboration between teachers, but in the absence of time and resources, these initiatives do not bring progress (Krasniqi, 2021). The context of the COVID-19 pandemic and the pressure of digitalization have accelerated the need for change and professional development (Herawati et al., 2022). The results of these studies show that policy initiatives encourage professional development only if they are accompanied by autonomy at the school level, adequate material resources, and the time needed for training.

Individual factors. Teaching experience, motivation and openness to learning are factors that determine the direction of teachers' careers (Kim & Lee, 2020; Herawati et al., 2022). Nguyen et al. (2020) show that teaching experience positively influences competences, and Xie et al. (2022) demonstrate that the effects of instructional leadership are stronger among early-career teachers, who need more support and mentoring; but as they gain experience, they become more autonomous. At the same time, teachers' involvement in continuing education depends on personal attitudes and beliefs (Thien & Liu, 2024), health status (Straková & Simonová, 2024), level of professional agency (Li et al., 2023) and self-efficacy (Herawati et al., 2022), willingness to receive and provide feedback (Volante et al., 2023), degree of professional awareness and desire for self-development (Meng & Chang, 2024).

5. Limitations and future directions

The studies in this systematic review are extracted from only 4 databases (Web of Science, Scopus, Sage, Springer), and the number is relatively small (24).

Most of the studies analyzed concern the use of self-reported data by teachers, and the results may be overestimated. The cross-sectional design of most studies limits the identification of causal relationships. Future research could analyze longitudinal data to assess the impact of instructional leadership in the long term. The results of the studies target specific regions (e.g., Kiribati, China) and cannot be generalized to other educational contexts. Specific practice patterns could be highlighted by future comparative research of education systems or education policies in different countries. Also, the professional development of teachers was analyzed as a unique concept. It is recommended to explore in more detail the types of professional development (e.g., individual/collective; formal/informal) in relation to different dimensions of instructional leadership (Kim & Lee, 2020). Another important aspect concerns the use of technology for career advancement, but it was not sufficiently highlighted by the studies included in this systematic review. Thus, future studies could investigate the role of digitalization in teachers' continuing training, as well as its effects on student motivation and outcomes.

Practical implications

This systematic review contributes to the evidence that highlights the impact of educational leadership on teachers' decisions to advance their careers and deepen their knowledge. The reviewed studies emphasize that educational excellence is a shared responsibility of society, school leaders, teachers, and parents. It is important to develop educational policies that expand the skills of an instructional leader and promote self-efficacy and collaboration among teachers (Meng & Chang, 2024). The exchange of good practices and professional development can be promoted through rigorous mentoring, coaching (Herawati et al., 2022), and quality feedback (Kraft & Christian, 2022). Principals who encourage teachers' autonomy, initiative, and conscious involvement in their own professional development enhance their expertise (Li et al., 2023). Thus, the central idea of this study emphasizes the importance of strategies that encourage collaboration, active participation, and professional development (Li et al., 2023; Kim & Lee, 2020; Meng & Chang, 2024), while highlighting the need to promote self-efficacy, recognize individual expertise, and cultivate willingness as key factors of teacher engagement.

6. Conclusions

This systematic review, covering the period 2020–2024, finds that instructional leadership is a central factor in teachers' professional development and in strengthening a school climate that supports learning and collaboration. Principals who use instructional practices, such as establishing a shared vision and facilitating teamwork, help improve teacher effectiveness, support lifelong learning, and promote collaboration within the school community.

The main contribution of this review is to clarify the conditions under which these effects occur and for whom they are strongest. The relationship between principal leadership and professional development is mediated by teachers' self-efficacy and professional agency, while being shaped by social, organizational, contextual, and individual factors. The effects are more pronounced among early career teachers and in schools with a collaborative culture and adequate resources. The COVID-19 pandemic and rapid digitalization have intensified these needs and highlighted the importance of ongoing support for teachers.

At the same time, differences have been identified between the types of schools: private or high-performing schools tend to apply more active instructional leadership, while schools with mature cultures are more resistant to change. Instructional leadership often complements distributed leadership, where responsibilities are shared between principals and teachers. In such contexts, the impact on continuous professional development is amplified.

Overall, instructional leadership supports teacher development and helps build an organizational culture focused on learning, collaboration, and innovation. Its effectiveness depends on educational policies, investments in principal training, adequate resources, and strategies adapted to the context of each school.

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Appendix

Tabel 1

Studies included in the systematic review

Database	Author(s) (year)	Title	Journal	Country/ Region	Aim	Methods	Results
WOS	Ansaah, E., Abonyi, U.K., & Salifu, I. (2024)	Headteachers' Instructional Leadership Practices: A Comparison of Public and Private Basic Schools in Two Selected Districts in Ghana	Leadership and Policy 'in Schools	Ghana (West Africa)	Substantiation of specific instructional leadership practices in public and private schools.	Cross-sectional study; simple random sampling of teachers; data collected via PIMRS [a]; statistical analyses: descriptive statistics and MANOVA.	Private schools are more supportive of lifelong learning opportunities for teachers, compared to state schools.
WOS	He, P., Guo, F., & Abazie, G.A. (2024)	School Principals' Instructional Leadership as a Predictor of Teacher's Professional Development	Asian-Pacific Journal of Second and Foreign Language Education	Nigeria (West Africa)	Investigating the influence of instructional leadership on teachers' professional development.	Instructional leadership model by Hallinger and Murphy (1985); PILPTPD [b] questionnaire; statistical analyses: correlation and multiple regression.	The instructional leadership of the principal has a strong and significant impact on the professional development of teachers.
WOS	Straková, J. & Simonová, J. (2024)	Why do teachers leave schools? Evidence from lower secondary schools in the Czech Republic	International Journal of Educational Management	Czech Republic (Central Europe)	Identify the factors that lead to teacher retention, comparing career stages.	Longitudinal design; statistical analysis: binary logistic regression.;	The instructional support of the principal for professional development is a factor that influences teachers not to quit their jobs.
WOS	Xie, Z., Wu, R., Liu, H., & Liu, J. (2022)	How Does Teacher-Perceived Principal Leadership Affect Teacher Self-Efficacy Between Different Teaching Experiences Through	Frontiers in Psychology	China Shandong Province	To analyze the teachers' perception about the influence of instructional leadership on didactic self-efficacy.	Standardized questionnaires based on the TALIS 2013 scale; statistical analysis: multilevel SEM.	A principal who encourages collaboration between teachers positively influences their self-efficacy.

		Collaboration in China? A multilevel structural equation model analysis based on threshold					
WOS	Rechsteiner, B., Compagnoni, M., Wullschleger, A., Schäfer, L.M., Rickenbacher, A., & Maag Merki, K. (2022)	Teachers Involved in School Improvement: Analyzing Mediating Mechanisms of Teachers' Boundary-Crossing Activities Between Leadership Perception and Teacher Involvement	Teaching and Teacher Education	Switzerland	Analyze the relationship between the principal's leadership and teachers' involvement in school improvement.	Statistical analysis by structural equation modeling (SEM); validation by confirmatory factor analysis.	Cognitive and social activities partially mediate the relationship between perceived leadership and teacher involvement.
WOS	Amzat, I.H., Yanti, P.G., & Suswandari, S. (2022)	Estimating the Effect of Principal Instructional and Distributed Leadership on Professional Development of Teachers in Jakarta, Indonesia	SAGE Open	Indonesia	Investigating the influence of instructional and distributed leadership on teachers' professional development.	Stratified seating and quota sampling; questionnaires based on the leadership scale proposed by Hallinger and Murphy (1985) and TALIS; statistical analysis: structural modeling by SmartPLS;	Instructional leadership positively influences distributed leadership. Both are positively associated with professional development.
WOS	Nguyen, D., Ng, D., Luo, W., & Mansor, S. (2020)	Exploring the Relationships Between Instructional Leadership and Teacher Competences: Singapore Primary School Teachers' Perceptions	International Journal of Leadership in Education	Singapore	Analysis of the relationship between instructional leadership and teacher competencies.	Data collected through questionnaires; statistical analyses: Rasch for validation of the measurement scale, ANOVA and hierarchical regression;	Leadership focused on professional development is positively associated with teachers' competences.
WOS	Krasniqi,R. (2021)	Principal Role in Supporting Teacher Collaborative Learning	Research in Educational Administration and Leadership	Kosovo	Examining the role of the school principal in supporting teachers to participate in collaborative learning activities.	Mixed study: questionnaires applied to teachers, analyzed through descriptive and inferential statistics; interviews with executives, analyzed thematically;	Principals have a key role in determining learning communities.
WOS	Alazmi, A.A., & Hammad, W. (2023)	Modeling the Relationship Between Principal Leadership and Teacher Professional	Educational Management Administration and Leadership	Kuwait	Investigate the role of learning-focused leadership in professional learning.	Statistical analyses: confirmatory factor analysis and SEM;	The indirect effect of the school leader on professional learning is achieved through the trust and

		Learning in Kuwait: The Mediating Effects of Trust and Teacher Agency					agency of teachers.
WOS	Paletta, A., Alimehmeti, G., Mazzetti, G., & Guglielmi, D. (2021)	Educational Leadership and Innovative Teaching Practices: A Polynomial Regression and Response Surface Analysis	International Journal of Educational Management	Italy	Investigate the factors that determine the adoption of innovative teaching practices.	Convenience sampling technique; statistical analyses: polynomial regression and response surface analysis;	Schools where principals and teachers agree on instructional leadership are associated with a higher level of innovative teaching practices.
WOS	Sibomana, I. (2020)	Perceptions of Teachers on Instructional Leadership Behaviors of Secondary School Principals in Rwanda	Educational Management Administration and Leadership	Rwanda	Analysis of teachers' perceptions of instructional leadership practices and their impact on professional development.	Statistical analysis in SPSS; calculation of means and standard deviations for determining the frequency of instructional leadership behaviors;	The results suggest the need to allocate resources to improve instructional leadership in Rwanda.
Scopus	Herawati, R., Tjahjono, H.K., Qamari, I.N., & Wahyuningsih, S.H. (2022)	Does Teacher's Willingness to Change Enhance Professional Competence?	European Journal of Educational Research	Indonesia	Analysis of how instructional leadership and self-efficacy influence professional competence after the COVID 19 pandemic.	Statistical analysis: SEM using AMOS 23.0; mediation analysis via Sobel test;	Instructional leadership significantly influences teachers' willingness to adapt and, indirectly, professional competence.
Scopus	Hua, S., Mansor, A.N., Bin Jamaludin, K.A., & Chen, X. (2024)	The Influence of Principals' Instructional Leadership on Teachers' Professional Learning Community: The Mediating Role of School Climate	Health, Science and Technology - Conference Series	Malaysia	Analysis of the impact of instructional leadership on professional development communities.	Statistical analyses: correlation analysis, mediation analysis and SEM;	The effect of leadership on teachers is entirely mediated by the school climate, through trust and the exchange of information.
Scopus	Meng, W. & Chang, Y-C. (2024)	The Effect of Perceived Principal's Instructional Leadership on Occupational Well-Being Among Rural Elementary and Middle School Teachers	The Open Psychology Journal	China	To investigate the impact of the instructional leadership of principals on the occupational well-being of teachers in rural areas.	Questionnaires distributed online; statistical analysis: SEM;	Didactic effectiveness and awareness of professional development have a mediating effect between perceived instructional leadership and occupational well-being.

Scopus	Hui, L.S., & Singh, G.S.B. (2020)	The Influence of Instructional Leadership on Learning Organization at High-Performing Primary Schools in Malaysia	Asian Journal of University Education	Malaysia	Analysis of the influence of the instructional leadership of principals on the learning organization in high-performance schools.	Questionnaires based on 2 instruments: PIMRS [a] and MSTS [c]; statistical analysis: SEM in AMOS 24;	Instructional leadership has a positive and significant influence on the organization of the learning process at the school level.
Scopus	Li, Y., Cai, Y., & Tang, R. (2023)	Linking Instructional Leadership and School Support to Teacher Expertise: The Mediating Effect of Teachers' Professional Development Agency	Sustainability	China	Examining the impact of principals' instructional leadership and school support on teachers' expertise.	Stratified cluster sampling; statistical analysis: SEM and bootstrapping;	Instructional leadership influences the development of teachers' expertise, but peer and student support are stronger factors.
Scopus	Kim, T., & Lee, Y. (2020)	Principal Instructional Leadership for Teacher Participation in Professional Development: Evidence from Japan, Singapore, and South Korea	Asia Pacific Education Review	Japan Singapore South Korea	Investigating the relationship between the instructional leadership of principals and teachers' participation in professional development.	International survey; two-stage stratified sampling; TALIS 2013 dataset; main method of analysis: two-level logistic regression;	Instructional leadership especially influences teachers' participation in activities such as mentoring, peer observation, and coaching.
Scopus	Owen, S.M. (2020)	Improving Kiribati Educational Outcomes: Capacity-Building of School Leaders and Teachers Using Sustainable Approaches and Donor Support	Journal of Adult and Continuing Education	Kiribati	Investigating the impact of instructional leadership on teachers' professional development and improving school outcomes.	Mixed research; monitoring through observations and satisfaction questionnaire;	Instructional leadership has helped improve teachers' competencies through ongoing coaching and mentoring.
Scopus	Volante, P., Müller, M., Salinas, A., & Cravens, X. (2023)	Expert Teams in Instructional Leadership Practices Based on Collaboration and Their Transference to Local Teaching Improvement Networks	Research in Educational Administration and Leadership	Chile	Analysis of the impact of instructional leadership and organized collaboration between teachers on teaching improvement.	Study design: design-based research (DBR); mixed-methods approach; five-dimensional questionnaire and semi-structured interviews with participants and a control group.	Collaborating teachers believe that instructional leadership effectively supports professional development.
Sage	Huang, L., Huang, Y., & Zhou, S. (2021)	Examining Principal Leadership Effects on Teacher Professional Learning in China: A	Educational Management Administration and Leadership	China	Exploring the influence of different leadership practices on personal learning and	Stratified sampling; questionnaires applied to teachers and principals, PISA 2015; statistical analysis: two-level	Instructional leadership (focused on improving teaching) has a positive impact

		Multilevel Analysis			collaborative learning.	hierarchical linear modeling (HLM);	on collaborative learning.
Sage	Kraft, M.A., & Christian, A. (2022)	Can Teacher Evaluation Systems Produce High-Quality Feedback? An Administrator Training Field Experiment	American Educational Research Journal	USA (Boston)	Analysis of the effectiveness of an evaluator training program to improve the feedback provided to teachers during the evaluation process.	Sampling technique: staggered randomized controlled trial; questionnaires applied to teachers and evaluators; experimental analysis based on statistical modeling;	Effective instructional leadership requires investment of time and resources to sustain professional development conversations.
Sage	To, K.H., Yin, H., Tam, W.W.Y., & Keung, C.P.C. (2023)	Principal Leadership Practices, Professional Learning Communities, and Teacher Commitment in Hong Kong Kindergartens: A Multilevel SEM Analysis	Educational Management Administration and Leadership,	Hong Kong	Examining the relationship between principals' leadership practices, professional learning communities (PLCs), and teachers' commitment to kindergartens.	Quantitative, cross-sectional study with multilevel structural equation modeling (MSEM);	The development of professional learning communities was facilitated by the leadership practices of school leaders.
Springer	Thien, L.M., & Liu, P. (2024)	Linear and Nonlinear Relationships Between Instructional Leadership and Teacher Professional Learning Through Teacher Self-Efficacy as a Mediator: a partial least squares analysis	Humanities and Social Sciences Communications	Malaysia	Investigating the linear and nonlinear relationships between the instructional leadership of principals and the professional learning of teachers, having as mediator the self-efficacy of teachers.	Quantitative, cross-sectional study; statistical analysis: partial least squares structural equation modeling (PLS-SEM);	Teachers' self-efficacy significantly mediates the relationship between instructional leadership and professional learning.
Springer	Klein, E.D., & Bronnert-Härle, H. (2020)	Mature School Cultures and New Leadership Practices—An Analysis of Leadership for Learning in German Comprehensive Schools	Journal of Educational Research	Germany	Analyzing leadership for learning in schools with a mature culture compared to schools with a young culture.	Quantitative, cross-sectional study; comparative analysis of leadership practices according to the age and culture of the school.	Instructional leadership and leadership practices for learning are less present in schools with a mature culture.

[a] Principal Instructional Management Rating Scale
[b] Principal's Instructional Leadership Practices and Teachers' Professional Development
[c] Middle School Teacher Survey

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Neuroeducation and Biology Learning Through the Lens of Cognitive Principles and Pedagogical Implications

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Neuroeducation and Biology Learning Through the Lens of Cognitive Principles and Pedagogical Implications

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Abstract

Neuroeducation integrates findings from cognitive neuroscience and psychology to inform effective teaching practices, offering a valuable framework for biology education. Contemporary research demonstrates that learning is not purely cognitive but is strongly influenced by emotions, motivation, and attentional processes. Emotional engagement, mediated by the limbic system, modulates memory consolidation, attention, and cognitive resource allocation, enhancing retention of complex biological concepts. Intrinsic motivation further supports persistence, metacognitive strategies, and active exploration, particularly in abstract or counterintuitive topics such as genetics, cellular processes, and ecological systems. Biology instruction can leverage these principles through narrative-based teaching, problem-solving tasks, inquiry-oriented activities, and real-life contextualization that connects scientific content to students' experiences. However, translating neuroscience findings into classroom practice faces challenges, including methodological limitations, differences in levels of analysis, and the persistence of neuromyths. Teacher training, ethical considerations, and evidence-based curricular design are essential to ensure responsible application. Integrating neuroeducational principles promotes multisystemic learning, fostering attention, memory, emotional engagement, and curiosity-driven exploration. By aligning teaching strategies with the brain's natural learning mechanisms, neuroeducation enhances conceptual understanding, engagement, and positive attitudes toward science. It provides educators with a scientifically grounded guide for designing biology lessons that are both effective and meaningful.

Keywords:
neuroeducation, biology learning, cognitive principles, motivation, emotions

1. Introduction

In recent decades, the field of education has undergone a profound transformation, marked by the integration of neuroscience research results into pedagogical theories and practices. This orientation, known as neuroeducation or brain-based education, proposes an interdisciplinary approach to the educational act, based on the understanding of the neurocognitive mechanisms that support the learning process (Sousa, 2016; Tokuhama-Espinosa, 2020). In essence, neuroeducation does not aim to simply apply neuroscience data in school, but to build an epistemological bridge between brain biology, cognitive psychology and educational sciences, in order to optimize student performance and motivation (Immordino-Yang, 2015).

In the context of scientific disciplines, biology occupies a central place in the formation of scientific thinking and logical reasoning skills. However, numerous studies highlight students' cognitive difficulties in learning complex biological concepts, such as cellular structure, molecular processes, or genetic mechanisms (Gilbert & Justi, 2016). These concepts involve operating with abstract levels of representation, often difficult to internalize through traditional teaching methods. This results in the need to identify scientifically grounded teaching strategies that facilitate the construction of coherent and sustainable mental models.

Neuroeducation offers a promising framework for responding to this challenge. By understanding how working memory, attention, emotions, and brain plasticity work, teachers can adapt biology teaching methods to actively stimulate students' cognitive processes (Neacşu, 2019). Recent studies show that effective learning involves not only reason, but also emotion, social context, and multisensory experiences, all integrated into the neural architecture of the brain (Caine & Caine, 1991).

This article aims to conduct a critical review of the literature on the application of neuroeducation principles in the learning of biology. The theoretical foundations of neuroeducation, the correlations between neurocognitive processes and teaching strategies, as well as the implications for teaching practice and teacher training are discussed. The main goal of the study is to highlight the potential of

neuroeducation to transform biology learning into an active, reflective and evidence-based approach to the functioning of the human brain.

2. Theoretical foundations of neuroeducation

Neuroeducation is an emerging interdisciplinary discipline, located at the intersection of neuroscience, cognitive psychology and pedagogy, which aims to translate research findings on brain function into effective teaching strategies. The aim of this approach is to base teaching and learning on empirical knowledge about neural plasticity, attention, memory, emotions and executive processes, so that learning is optimized and adapted to the cognitive needs of students (Sousa, 2016; Tokuhama-Espinosa, 2020). Neuroeducation is not limited to the simple application of scientific data, but involves a systematic integration of cognitive and affective principles in the design of educational activities and the assessment of learning outcomes (Jolles & Jolles, 2021).

One of the central concepts in neuroeducation is brain plasticity, that is, the ability of the brain to form and reorganize neural connections in response to experience and learning. This allows information to be transformed and consolidated into long-term memory and supports the idea that didactic interventions can have a significant impact on cognitive development at all ages (Zull, 2023). In parallel, working memory has a limited capacity, which means that new information must be presented in a structured and sequential manner, avoiding cognitive overload. Studies show that materials presented in multisensory contexts, correlated with prior knowledge, are processed more efficiently and retained longer (Barutchu et al., 2020; Sweller, 1988).

Attention is another essential factor in neuroeducation, being considered the "gateway" to the learning process. Research indicates that attention decreases after short intervals, which is why educational activities must include task switching, cognitive breaks, and challenges that stimulate active student engagement (Scherer & Mason, 2019). At the same time, the role of emotions and motivation cannot be underestimated. Positive emotions facilitate the encoding and consolidation of information, and affective engagement increases the retention capacity and application of knowledge. In contrast, stress or negative emotions can inhibit executive functions and learning (Immordino-Yang, 2015).

Neuroeducation also supports contextual and multisensory learning. Activities that simultaneously involve multiple sensory channels—visual, auditory, and kinesthetic—and that link new concepts to relevant experiences activate multiple neural circuits, facilitating the processing and memorization of information. In addition, the development of metacognition and self-regulation in learning, i.e. the ability of students to reflect on their own cognitive processes and adjust their learning strategies, is supported by the executive functions of the brain and has significant effects on academic performance (Follmer & Sperling, 2016).

However, the implementation of neuroeducation in practice must be done with caution. There are numerous "neuromyths" in education, such as the left/right hemisphere theory or rigid learning styles, which can deviate the correct application of scientific discoveries. Also, the translation of mechanisms observed in the laboratory into real school contexts is complex and requires the adaptation of activities to the specificities of students and the educational environment (Dekker et al., 2012; Howard-Jones, 2014). Socio-educational factors, such as sleep, nutrition and family context, also influence the learning process and must be integrated into the pedagogical analysis.

Thus, neuroeducation provides a robust theoretical framework for understanding how students learn, laying the foundation for innovative and effective teaching strategies in biology teaching. By integrating cognitive and affective principles, teachers can design lessons that not only convey information, but also stimulate critical thinking, motivation, and active engagement of students, thus maximizing the results of the educational process.

3. Applying neuroeducation principles in biology teaching

Applying neuroeducation principles in biology teaching involves translating neurocognitive concepts such as synaptic plasticity, working memory, attention, motivation, emotion, and executive functions into concrete teaching strategies that are adapted to the complex nature of the subject (dynamic processes, invisible patterns, multiple levels of biological organization). The main goal is to build accurate mental models, consolidate knowledge, and facilitate long-term transfer and retention, while reducing cognitive overload and preventing misconceptions through active exposure to evidence and conceptual modeling (Sweller, 1988; Tokuhama-Espinosa, 2010). This translation must take into account both experimental evidence and the real limitations of the classroom, space, time, resources,

and cognitive diversity of students (Howard-Jones, 2014).

3.1. Multisensory learning and the development of mental representations

Biology teaching can be substantially enhanced by the deliberate integration of multisensory learning experiences, as neuroscientific literature demonstrates that the simultaneous processing of information from visual, auditory, tactile, and kinesthetic sources leads to the activation of distributed neural networks, favoring both synaptic consolidation and the formation of more coherent and stable cognitive structures (Baddeley, 2012; Shams & Seitz, 2008). In the context of biology, a discipline that often involves processes inaccessible to direct perception, such as the translocation of ions through membrane channels, the transcription and translation of genetic material, or the dynamics of biogeochemical cycles, multisensory stimulation functions as a conceptual anchoring mechanism, facilitating the mental representation of abstract phenomena.

Thus, effective teaching strategies include combining verbal presentations with animations, graphic representations, digital simulations, 3D models and micro-experiments, elements that amplify useful information redundancy and reduce the risk of forming erroneous concepts. By overlapping these processing channels, a mutual reinforcement of perceptual codes is achieved, a phenomenon supported by working memory theories and research on multisensory integration in the associative cortex (Baddeley, 2012). Also, comparative studies consistently emphasize the superiority of multisensory training programs over unisensory ones, especially in terms of long-term retention, cross-contextual transfer and resistance to conceptual interference (Shams & Seitz, 2008).

The practical application of these principles involves structuring lessons in short temporal sequences, according to the "chunking" model, to optimize cognitive load: a concise introduction to the concept (3–7 minutes), followed by a visual-interactive stage (e.g., viewing an animation or manipulating a three-dimensional model), complemented by a kinesthetic activity (mini-experiment, molecular model reconstruction) and concluded by a moment of metacognitive reflection (learning journal, written analysis, self-explanation). This alternation between modalities not only respects the operational limits of working memory, but also facilitates spaced repetition and varied encoding, two mechanisms empirically demonstrated to be fundamental for the sustainability of learning (Baddeley, 2012; Sweller, 1988).

Therefore, integrating multisensory learning into biology teaching is not limited to diversifying activities, but involves intentional instructional design that aims to balance cognitive tasks, maintain attentional activation, stimulate semantic elaboration, and consolidate long-term memory through coordinated activation of neural networks involved in perception, representation, and scientific reasoning.

3.2. Scientific storytelling, analogies and conceptual modeling

Biology, by its nature, involves describing and understanding complex processes and transformations at the molecular, cellular, and ecosystem levels, making it well-suited for the use of educational storytelling. Scientific narrative allows students to organize information sequentially, build coherent mental models, and anticipate causal relationships between elements (Bruner, 1991; Green, 2006). For example, presenting the trajectory of a glucose molecule from ingestion to ATP generation stimulates both planning and attention systems, as well as circuits responsible for temporal integration and event prediction (Immordino-Yang & Damasio, 2008). Introducing the narrative component reduces conceptual ambiguity and facilitates the transfer of knowledge between varied contexts, by creating a meaningful and memorable learning framework (Mayer, 2014).

Conceptual analogies, such as "ribosomes as factories," "enzymes as keys to locks," or "membranes as dynamic semipermeable filters," are powerful cognitive scaffolding tools. However, the literature warns that using analogies without metacognitive guidance can lead to unwarranted extension of analogies and the formation of erroneous representations (Duit, 1991; Glynn, 2012). To prevent these effects, students should be actively involved in analyzing the limits of analogies and comparing them with empirical evidence.

Conceptual modeling is another central tool in biology teaching, including concept maps, diagrams, dynamic models, and interactive simulations. The process of building, testing, and revising models involves executive functions, planning, inhibition, cognitive flexibility, and progress monitoring, and promotes the detection of conceptual dissonance, the correction of misconceptions, and the consolidation of deep and transferable understanding (Gobert &

Buckley, 2000; Hmelo-Silver et al., 2007). Thus, students do not simply memorize facts, but learn to relate and integrate different levels of biological organization, from the molecular to the organismic, developing critical thinking and cognitive self-regulation skills.

Therefore, the combination of storytelling, well-guided analogies, and conceptual modeling provides an integrated framework that optimizes cognitive and affective activation, stimulates working memory and executive functions, and contributes to the development of robust and sustainable scientific understanding (Sweller, 1988; Tokuhama-Espinosa, 2010).

3.3. Learning through inquiry and interactive activities

Inquiry-based learning methodologies, complemented by structured collaborative activities, are powerful pedagogical tools for stimulating executive functions, planning, inhibition, cognitive flexibility, and developing metacognition, essential components of self-regulated learning (Hmelo-Silver et al., 2007; Tokuhama-Espinosa, 2010). By asking students to formulate hypotheses, design experiments, and collect and analyze data, these methodologies encourage active application of knowledge and continuous monitoring of progress, which leads to deliberate adjustment of cognitive strategies in real time (Hmelo-Silver et al., 2007).

In biology, problem-focused activities allow students to explore simulated ecosystems, test the effect of abiotic factors on communities of organisms, or investigate cellular processes through virtual experiments and micro-laboratories. By directly engaging in data generation and verification, students develop critical thinking skills, problem-solving skills, and the ability to construct explanations based on empirical evidence (Gobert & Buckley, 2000; Hmelo-Silver et al., 2007).

Systematic reviews and longitudinal studies indicate that inquiry-based approaches lead to improved conceptual transfer, deeper understanding, and higher academic performance compared to traditional methods based solely on theoretical exposure (Furtak et al., 2012; Lazonder & Harmsen, 2016). These effects are more pronounced when activities are designed to integrate both cognitive and affective components, with motivation, curiosity, and emotional engagement significantly influencing information encoding and retention (Immordino-Yang & Damasio, 2007).

Therefore, inquiry-based learning and interactive activities not only allow the construction of solid scientific knowledge, but also the development of flexible, self-regulated thinking capable of transferring concepts to new contexts, thus strengthening sustainable learning in biology (Hmelo-Silver et al., 2007; Tokuhama-Espinosa, 2010).

3.4. Educational technologies: VR/AR, simulations and formative assessments

The integration of emerging technologies, such as virtual reality (VR), augmented reality (AR), and interactive simulations, constitutes an advanced instructional strategy in biology teaching, facilitating the exploration of microscopic phenomena or invisible processes, inaccessible to direct observation in the context of the traditional classroom (Radianti, Majchrzak, Fromm & Wohlgenannt, 2020). These technological environments allow the construction of immersive experiences, which simultaneously stimulate multiple sensory channels, activating integrated neural networks and favoring the sustainable encoding of knowledge (Baddeley, 2012; Shams & Seitz, 2008).

The effectiveness of VR/AR in science education depends largely on the instructional design, which must be deliberate and oriented towards cognitive activation. Interventions based on guided integration, reflective tasks, and iv-formatted feedback promote active learning and avoid turning technology into a passive tool (Sweller, 1988; Tokuhama-Espinosa, 2010). Furthermore, VR/AR allows for real-time manipulation of variables, hypothesis testing, and visualization of dynamic models of biological systems, providing opportunities for deep conceptual understanding and contextual transfer (Mayer, 2014; Radianti et al., 2020). In addition, the use of interactive technologies can facilitate personalization of learning, adjusting the pace and level of complexity for each student, helping to reduce cognitive overload and optimize affective and motivational engagement. Studies suggest that the deliberate integration of VR/AR, in combination with other multisensory and inquiry-based learning methods, maximizes the benefits of instruction and stimulates the development of executive functions and critical thinking (Immordino-Yang & Damasio, 2007; Tokuhama-Espinosa, 2010).

Therefore, VR/AR should not be viewed solely as a technological innovation, but as a strategic pedagogical tool, designed to extend the learning experience, facilitate the encoding and retention of

complex information, and enable the exploration of invisible biological phenomena in an interactive, meaningful, and cognitively challenging way (Radianti et al., 2020; Shams & Seitz, 2008).

3.5. Implications for motivation, attention, and performance

The integration of multisensory strategies, educational storytelling, and investigative activities has profound effects on students' affective and cognitive engagement. The literature emphasizes that stimulating curiosity, satisfaction, and intrinsic motivation favors the efficient encoding of information in memory and facilitates the transfer of knowledge to new and complex contexts (Immordino-Yang & Damasio, 2007; Tokuhama-Espinosa, 2010).

Deliberate alternation of activity types, combining visual exposure, practical manipulation, and metacognitive reflection, along with planned cognitive breaks, helps prevent working memory overload and maintain attention throughout the lesson (Baddeley, 2012; Sweller, 1988). These interventions also allow the strengthening of neural networks involved in focused attention, emotional regulation, and multisensory information processing, which leads to optimized academic performance and a greater ability to apply knowledge in new situations (Immordino-Yang & Damasio, 2007; Mayer, 2014).

Continuous formative feedback, implemented in parallel with interactive activities, amplifies the learning process by monitoring progress, adjusting individual strategies, and stimulating cognitive self-regulation. Thus, students not only accumulate information, but also develop metacognitive skills, cognitive flexibility, and problem-solving skills, all fundamental elements for sustainable understanding and conceptual transfer in biology (Hmelo-Silver et al., 2007; Tokuhama-Espinosa, 2010).

Therefore, the careful combination of multisensory elements, educational narratives and investigative activities constitutes a robust pedagogical framework, which simultaneously optimizes attention, motivation, affective involvement and cognitive performance, respecting the principles of neuroeducation and promoting deep and sustainable learning (Baddeley, 2012; Immordino-Yang & Damasio, 2007; Sweller, 1988).

3.6. Practical recommendations for biology teachers

Implementing neuroeducation principles in the teaching of biology requires a deliberate, evidence-based instructional design that aligns cognitive mechanisms with pedagogically validated strategies. Central to this approach is the structuring of lessons into short, coherent instructional segments (chunking), which reduces cognitive load and supports the efficient transfer of information into long-term memory (Baddeley, 2012; Sweller, 1988). Instruction should integrate verbal explanations with visual representations, diagrams, animations, and manipulable three-dimensional models, following the cognitive theory of multimedia learning, which demonstrates that dual-channel processing enhances comprehension and retention (Mayer, 2009; Shams & Seitz, 2008). Alternating these modalities with reflective pauses and brief metacognitive prompts encourages students to monitor their own understanding and regulate their cognitive strategies.

A critical component of effective biology instruction involves the responsible use of analogies and conceptual models. Teachers must systematically guide students in identifying both the strengths and limitations of analogies, contrasting intuitive explanations with empirical evidence in order to prevent the formation of robust misconceptions—a recurrent challenge in biological education (Duit, 1991; Glynn, 1991). This process not only strengthens conceptual accuracy but also cultivates scientific reasoning. Laboratory investigations, mini-experiments, and other forms of hands-on inquiry play a pivotal role in developing students' executive functions and higher-order reasoning skills. Such activities give learners opportunities to formulate hypotheses, design experimental procedures, interpret data, and evaluate their cognitive strategies, thereby consolidating metacognition and critical thinking within authentic scientific contexts (Hmelo-Silver et al., 2007; Tokuhama-Espinosa, 2010).

Educational technologies, including virtual reality (VR) and augmented reality (AR), can further support conceptual understanding when integrated purposefully. Their pedagogical value lies not in passive immersion but in enabling students to visualize complex biological structures, manipulate variables safely, test predictions, and engage in guided inquiry. Effectiveness depends on structured teacher mediation, reflective tasks, and feedback mechanisms that ensure cognitive activation rather than superficial engagement (Radianti et al., 2020; Tokuhama-Espinosa, 2010). Continuous formative assessment—implemented through short quizzes, reflective writing tasks, peer feedback, and teacher observations—supports the monitoring of students' cognitive

progress in real time, facilitates adaptive instructional decisions, and promotes the development of self-regulated learning (Black & Wiliam, 1998; Hmelo-Silver et al., 2007). Beyond instructional techniques, the successful application of neuroeducation depends on teachers' ongoing professional development, particularly in understanding neuroscientific evidence and identifying neuromyths that could distort educational practice. Training that strengthens teachers' scientific literacy and capacity for critical evaluation ensures that neuroeducation is applied rigorously and ethically in the classroom (Howard-Jones, 2014; Tokuhama-Espinosa, 2010).

3.7. Limits and precautions

Despite significant advances in neuroeducation, the application of neuroscientific findings in the school context must be done with methodological caution. Many experimental results from laboratory studies — often conducted in controlled environments, on small populations — do not automatically transfer to effective pedagogical practices in real classrooms, where cognitive, emotional, and socio-economic variability is considerably greater (Bruer, 1997; Rogers & Thomas, 2022).

In addition, the literature indicates the persistence of some extremely widespread neuromyths in education, such as the idea of hemispheric dominance (left/right), the myth of fixed learning styles, or the overvaluation of strictly visual or auditory-kinesthetic processes. These erroneous conceptions, although popular, contradict the scientific consensus and can lead to counterproductive didactic implementations (Dekker et al., 2012; Howard-Jones, 2014). Therefore, teachers must base their decisions on empirically validated data, not on simplified or overly extrapolated statements.

Another critical element is the complexity of translating neural mechanisms into applicable pedagogical recommendations. Processes such as synaptic plasticity, working memory, or attention are phenomena dependent on numerous biological, contextual, and psychological variables, and the literature warns that reducing them to rigid didactic "recipes" risks ignoring individual differences and learning group dynamics (Rogers & Thomas, 2022; Tokuhama-Espinosa, 2010). Therefore, educational interventions must be validated through classroom studies, using experimental or quasi-experimental designs, before being implemented on a large scale.

Also, socio-educational factors such as sleep quality, nutrition, stress level, emotional stability, family support and environmental security strongly influence the learning process and can modulate the effectiveness of any neuroeducational intervention (Immordino-Yang & Damasio, 2007; Taras & Potts-Datema, 2005). Ignoring these variables can lead to overestimation of the impact of teaching strategies, since academic performance is the result of the interaction between biology, psychology and the socio-cultural context.

Consequently, the implementation of neuroeducation principles must be an iterative process, based on piloting, continuous monitoring and progressive adaptation to the needs of students. A systematic evaluation of the effects, using valid instruments and clear criteria, is necessary to determine whether the intervention produces real, stable and replicable improvements. Only in this way can neuroeducation be avoided from becoming a set of pseudo-scientific practices and a rigorous, evidence-based pedagogical approach be ensured (Howard-Jones, 2014; Tokuhama-Espinosa, 2010).

4. The role of emotions and motivation in learning biology

Over the past two decades, the literature in cognitive neuroscience, educational psychology, and neuroeducation has converged on the idea that learning cannot be conceptualized as a purely cognitive process; on the contrary, it is inseparable from the emotional states and motivational dynamics of the subject (Immordino-Yang & Damasio, 2007; Pekrun, 2017). This perspective represents an epistemological break with traditional paradigms that considered emotions as disruptive factors of reasoning. Modern neurobiological research demonstrates that emotions constitute the functional background architecture of higher cognitive processes: they modulate attention, influence the depth of processing, reorganize neural networks involved in memory consolidation, and determine the energetic availability of the prefrontal cortex in complex learning tasks (Pessoa, 2008; Tyng et al., 2017).

Biology teaching highlights this interdependence in a privileged way, because the discipline requires not only a conceptual understanding of abstract processes such as DNA replication, homeostasis, photosynthesis, gene expression, and population dynamics, but also the ability to relate these processes to personal, social, emotional, and ethical realities. The invisible processes, the multiple levels of organization (molecular, cellular, tissue, organismic, ecosystemic), and the interdisciplinary nature of

biology imply a high cognitive load, which makes emotions and motivation become fundamental resources for supporting attention and persistence in the task (Mayer, 2014; Sweller et al., 2011).

From a neurobiological point of view, emotions influence biology learning by activating the limbic system, especially the amygdala, which facilitates the selection of relevant stimuli and the signaling of their biological importance (Phelps, 2006). The interaction between the basolateral amygdala and the hippocampus, which has been extensively documented in recent years, plays a key role in consolidating episodic and semantic memory, leading to enhanced retention of information associated with emotional stimulation (McGaugh, 2018). This relationship explains why students more easily retain biological concepts presented through personal, clinical, or narrative examples, such as the story of a patient with a genetic disorder or the evolution of an ecosystem after a catastrophe. Moderate activation of the limbic system has been shown to enhance synaptic plasticity in cortical regions associated with conceptual learning (Shohamy & Adcock, 2010), which has major implications for teaching difficult biological concepts, especially counterintuitive ones.

In parallel, emotions directly influence the availability of cognitive resources by modulating attentional networks oriented towards key stimuli. The salience network, located in the anterior insula and anterior cingulate cortex, detects relevant changes in the learning environment and switches between the executive and implicit networks (Seeley et al., 2007). Thus, positive emotional states of interest, admiration, "epistemic curiosity" optimize attentional orientation and increase the student's ability to follow complex biological explanations, such as metabolic fluxes or immunological mechanisms (Gruber & Ranganath, 2019; Kang et al., 2009).

Motivation, especially intrinsic motivation, contributes to biology learning by enhancing persistence, managing cognitive effort, and promoting the use of advanced metacognitive strategies. According to Self-Determination Theory, students are profoundly influenced by the extent to which learning activities satisfy psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2024). Biology has a unique potential to generate intrinsic motivation because it provides authentic and relevant contexts, from explaining the functions of one's own body to understanding climate change or the pandemic. Students perceive biology as having a direct impact on their identity and lives, and this perception translates into increased cognitive engagement and a tendency for self-explanation and autonomous investigation (Hidi & Renninger, 2015; Vansteenkiste et al., 2006).

The role of negative emotions, although often presented in popular literature as purely destructive, is much more nuanced in current research. Moderate stress can increase alertness and focused attention, but high levels of anxiety, especially evaluative anxiety, reduce the functioning of the dorsolateral prefrontal cortex, directly affecting working memory and the ability to integrate information, skills essential in biological tasks that involve complex reasoning, such as solving genetic problems or analyzing experimental data (Owens et al., 2012). In the context of biology, certain topics can provoke emotional rejection, anxiety, shame, or cultural resistance: lessons on reproduction, anatomy, evolution, or communicable diseases can activate cognitive defense mechanisms that prevent deep information processing (Nadelson & Southerland, 2012). Sensitive management of these topics requires, according to pedagogical research, a safe socio-emotional climate and a non-evaluative didactic discourse that reduces perceived threat and facilitates conceptual exploration.

Curiosity, recently recognized as an affective-motivational component with a high impact on science learning, is a strong predictor of long-term memory and conceptual transfer (Gruber & Ranganath, 2019). In biology, natural paradoxes, uncertainties, and mysteries—the emergence of bacterial resistance, emerging animal behaviors, symbioses, genetic mutations, and microbiome interactions—trigger neural exploration mechanisms associated with activation of the hippocampus and mesocorticolimbic dopaminergic circuits (Kang et al., 2009). This neurobiological combination explains why problem-focused and inquiry-based instructional structures significantly increase student performance. Integrating emotions and motivation into biology instructional design is essential for maximizing learning. Scientific narrative, the use of realistic scenarios, ethical framing of content, and connecting concepts to personal experiences generate positive emotional states and increase the sense of relevance (Dahlstrom, 2014). In parallel, formative feedback oriented towards progress rather than performance stimulates intrinsic motivation and reduces evaluative anxiety (Hattie & Timperley, 2007). Also, emotional regulation strategies such as cognitive reappraisal, controlled breathing or error normalization contribute

to maintaining a beneficial learning climate, especially in lessons with high emotional load (Gross, 2015). In conclusion, emotions and motivation are not peripheral factors in learning biology, but constitute the functional foundation of cognitive processes that allow the development of scientific understanding. Teaching biology requires an integrated, neuroscientifically informed approach, in which the curriculum design, didactic strategies and classroom atmosphere are calibrated to activate positive emotions, to stimulate intrinsic motivation and to diminish affective barriers. Such an approach not only optimizes current performance, but also contributes to the formation of a sustainable, positive and reflective relationship of students with life science.

5. Discussions and challenges

Despite the considerable progress of neuroeducation and the growing enthusiasm for integrating neuroscientific knowledge into pedagogical practice, the application of these discoveries in the school environment remains marked by multiple epistemological, methodological and institutional difficulties. Although numerous studies suggest that a thorough understanding of neurocognitive mechanisms can contribute to the optimization of didactic strategies, their direct transposition into didactic activity is far from being a linear or unambiguous process. The limitations result both from the complexity of neuronal organization and from the conceptual distance between the levels of analysis specific to neuroscience and those specific to pedagogy.

The first major challenge concerns the fundamental difference between the neurobiological and educational levels. Neuroscience operates with microscopic measurements, at the level of synapses, neurotransmitters or neural networks, while education deals with macrosocial phenomena, such as the development of skills, motivation, classroom interactions and instructional processes. However, this structural difference makes it difficult to directly infer pedagogical recommendations based exclusively on neuroscientific data. The epistemological equivalent of this problem is the "level error" the tendency to extrapolate mechanisms identified at the neuronal level to complex behaviors, without an intermediate stage of psychological and educational validation. Therefore, the scientific community warns that neuroeducation should not be viewed as a set of immediately applicable solutions, but as a source of general principles that require translation and adjustment at the pedagogical level. In the absence of this mediation process, there is a risk of generating reductive or even erroneous interpretations of brain functioning.

This difficulty directly contributes to the emergence of neuromyths – overly simplified, scientifically unvalidated or even counterfactual conceptions that frequently circulate in the educational environment. These include the idea that students learn predominantly through the left or right hemisphere, the theory that individuals have rigid learning styles ("visual," "auditory," "kinesthetic"), or the belief that exposure to classical music automatically stimulates cognitive development. These concepts, although popular, have been repeatedly refuted by the specialized literature, which shows that brain functioning is deeply integrated and dynamic, and sensory preferences do not, in themselves, determine academic performance. The persistence of these neuromyths is supported by three main factors: teachers' limited access to reliable scientific sources, the difficulty of interpreting the results of neurobiological studies, and the attractive rhetoric of these ideas, which promise quick solutions to complex problems. As a result, without the critical filter of continuing professional development, teachers may adopt unvalidated practices that are not only ineffective, but can also consume time and resources to the detriment of empirically based pedagogical strategies.

These challenges highlight the urgent need for teacher training in neurodidactics. For teachers to be able to use neuroscience information responsibly and effectively, it is essential that they acquire a minimal neuroeducational literacy that allows them to distinguish between solid results and speculative interpretations. Initial training in pedagogical institutions rarely includes courses in applied cognitive neuroscience, and in-service training programs are often fragmentary or theoretical. In the absence of formal education, teachers remain vulnerable to pseudoscientific discourses, which highlights the need for an institutional infrastructure capable of offering rigorous, interdisciplinary programs focused on the synthesis of neuroscience, psychology, and pedagogy. In addition, training must integrate practical aspects, such as critical interpretation of data, design of didactic interventions, and evaluation of their impact on learning.

In parallel, current discussions in neuroeducation focus on future research directions, which must

address the methodological limitations of the field. A major challenge is the difficulty of constructing longitudinal empirical studies that track the effects of brain-based instructional strategies in real-world learning contexts. Much neuroscience research is conducted in laboratory settings, using small samples or simplified tasks, which raises issues of external validity. For neuroeducation to become a robust field, closer alignment between laboratory research and situated educational research is needed, using hybrid methodologies such as design-based research, naturalistic neuroimaging, or field studies integrated with physiological measurements. It is also necessary to develop standardized instruments for evaluating neuroeducational interventions, so that the impact on school performance, student motivation, and executive functioning can be accurately determined.

Last but not least, ethical challenges are an emerging area of discussion. The use of neural monitoring technologies or biometric data in educational contexts raises sensitive questions regarding privacy, informed consent and the risk of pathologizing natural cognitive differences. Any application of neuroeducation principles must respect a rigorous ethical framework, aimed at protecting students, avoiding premature labeling and promoting an inclusive vision of cognitive diversity. Overall, the discussions and challenges that accompany the application of neuroeducation in schools should not be interpreted as insurmountable obstacles, but as opportunities for conceptual and methodological refinement. Neuroeducation does not promise miraculous solutions, but offers a theoretical framework capable of enriching traditional pedagogy by understanding the neurocognitive mechanisms that support learning. To fully benefit from its potential, genuine interdisciplinary collaboration, rigorous professional training of teachers and a critical, evidence-based approach to the proposed strategies are necessary. Only under these conditions can neuroeducation evolve from an emerging field to a mature one, capable of substantially contributing to the transformation of contemporary education.

6. Conclusions

The conclusions of this paper reveal that neuroeducation represents a solid and increasingly influential conceptual framework for optimizing the teaching and learning processes of biology, a discipline that, by its very nature, requires a constant articulation between different levels of abstraction: molecular, cellular, organismic and ecosystemic. To the extent that it describes the neurocognitive mechanisms underlying perception, attention, memory and motivation, neuroeducation offers a scientific foundation that can guide teachers in designing learning experiences adapted to the functioning of the human brain. This perspective does not promise simplified solutions, but rather requires a complex approach, based on a critical understanding of experimental data and their responsible transposition into pedagogical practice. The integration of neuroeducation principles in biology teaching indicates that learning processes are essentially multisystemic: they depend simultaneously on attentional structures, working memory, long-term consolidation mechanisms and emotional networks that modulate student engagement. From this perspective, the scientific understanding of synaptic plasticity, reconsolidation processes or the role of emotional charge in the formation of memories becomes a fundamental tool for building effective teaching sequences. In addition, current research shows that learning is optimally achieved when the student is placed in situations of active exploration, problem solving or conceptual modeling, practices that support the development of executive functions and favor the transfer of knowledge to new contexts. On the other hand, the conclusions also highlight the essential need for epistemological prudence. The field of neuroeducation is crossed by numerous conceptual vulnerabilities, in particular the tendency to over-simplify neuronal phenomena or to uncritically extrapolate laboratory data to classroom activities. The persistence of neuromyths demonstrates that, in the absence of solid training, teachers can adopt practices that superficially claim to be from neuroscience, without having a real empirical basis. Thus, the fundamental responsibility of researchers, trainers and educational institutions is to build solid bridges between neuroscientific discoveries and pedagogy, through rigorous, accessible and constantly updated training programs.

The results of the analyzed studies suggest that biology teachers can particularly benefit from understanding the principles of neuroeducation, because this discipline requires a complex operationalization of theoretical concepts, explanatory models and visual tools. In the context of biology, students' difficulties often stem from excessive abstraction, the complexity of invisible processes or high cognitive load. Precisely for this reason, knowledge of the limits of working memory, how multisensory coding is achieved or the role of

sustained attention becomes essential to design lessons that facilitate the construction of stable mental models.

Reflecting on future directions, the paper highlights the need for interdisciplinary research that links neuroimaging, cognitive psychology, and pedagogy to systematically assess the impact of instructional interventions on real-world learning in the classroom. Longitudinal studies, experimental designs adapted to authentic teaching situations, and standardized instruments capable of measuring changes in performance, motivation, and executive function are needed. Only by strengthening the empirical base can neuroeducation evolve from a promising field to a scientifically established one. Overall, the conclusions of this paper emphasize that neuroeducation should not be viewed as a panacea or a speculative field, but as a space for dialogue between neuroscience and education. Its power derives not from magic formulas, but from its ability to provide teachers with a deeper understanding of how the brain learns, so that the instructional process becomes more efficient, more flexible, and more adapted to the cognitive diversity of students. Biology teaching, by its complex nature, is among the areas that can benefit most from this integrative perspective.

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Gratitude and Well-being in Emergent Adults

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Literature Review

Gratitude and Well-being in Emergent Adults

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Abstract

Gratitude is one of the most studied aspects within the field of positive psychology in recent years and the interest in exploring gratitude and its effects on well-being has increased considerably. The period of emerging adulthood, a transitional phase characterized by numerous changes and challenges, poses risks to maintaining well-being, which justifies the importance of researching protective factors such as gratitude. This paper analyzes the relationship between gratitude and well-being among emerging adults, through a systematic review, using the PRISMA methodology, a standardized and rigorous protocol for study selection and 17 relevant studies were included in the analysis. The results clearly indicate a positive and significant relationship between gratitude and well-being, with gratitude having a positive impact on several dimensions of well-being: hedonic and eudaimonic, subjective (life satisfaction, positive and negative affect), and psychological and social well-being. This association is supported by several mediators identified in the literature, with time perspectives being among the most important. The literature reviews align with Fredrickson's Broaden-and-Build Theory, which posits that positive emotions, such as gratitude, contribute to the development of psychological and social resources. This is a significant contribution to the field of positive psychology with an updated and comprehensive synthesis of existing work on gratitude among young adults. This research can be a theoretical framework for future enquiries aimed at developing gratitude-based interventions for students, a group prone to high levels of stress as well as research targeting the entire stage of emerging adulthood, beyond the academic context.

Keywords:
gratitude, well-being, emergent adult

1. Introduction

Positive psychology is a branch of psychology officially recognized as such in 1998 by Martin E. P. Seligman, former president of the American Psychological Association (Seligman & Csikszentmihalyi, 2000). This marked a paradigm shift that redirected psychologists' and researchers' attention toward identifying and supporting the positive aspects of human beings: qualities, well-being, and human potential. According to Seligman and Csikszentmihalyi (2000), positive psychology focuses on the individual's positive personal traits (such as the ability to love, courage, interpersonal skills), positive emotions (e.g., happiness, hope, gratitude), and positive institutions that contribute to the development of human potential (such as compassion, civic spirit, responsibility). The beneficial effects of positive emotions on well-being have been well documented (Gruber et al., 2014; Seligman & Csikszentmihalyi, 2014).

Gratitude has been studied especially over the last 25 years (Portocarrero et al., 2020), drawing attention in the field of positive emotions research due to its role in connecting with others (Emmons & McCullough, 2003; Lyubomirsky & Layous, 2013; McCullough et al., 2002; Wood et al., 2010), forming and maintaining social relationships (Algoe et al., 2008), resolving interpersonal conflicts and increasing prosocial behavior (Baron, 1984; Kardas et al., 2019; Tsang, 2006), enhancing relationship satisfaction (Algoe et al., 2010; Bono & Sender, 2018), decreasing loneliness (Hittner & Widholm, 2024; Caputo, 2015; Ni et al., 2015; O'Connell et al., 2016), ensuring social support (Xiang et al., 2018), supporting emotional regulation (Boggio et al., 2019; Demichelis et al., 2024), reducing stress (Rash et al., 2011; Demichelis et al., 2024), lowering levels of depression and anxiety (Cunha et al., 2019; Diniz et al., 2023; Petrocchi & Couyoumdjian, 2015), increasing self-esteem (Rash et al., 2011), and enhancing life satisfaction (Salvador-Ferrer, 2017). All of these factors contribute to both hedonic and eudaimonic well-being, integrating psychological, subjective, and social well-being (Czyżowska & Gurba, 2022; Watkins et al., 2014; Hill et al., 2012; McCullough et al., 2002; Tan et al., 2021; Watkins et al., 2003; Wood et al., 2010).

Emerging adulthood, spanning from ages 18 to 29, is recognized as a distinct and often challenging period in life. It is characterized by identity exploration, instability, the feeling of being "in between," self-focus, and a multitude of opportunities. Although it is

a stage of personal growth and development (Arnett, 2023), it is also associated with numerous stressful life events, potential exposure to traumatic events (Galatzer-Levy et al., 2012), and role transitions that increase the risk of psychopathology—making it a period of heightened vulnerability (Duprey et al., 2018; Bali et al., 2022) and impacting the well-being of emerging adults (Sakala et al., 2020). A large portion (approximately 75%) of mental, emotional, and behavioral disorders appear by the age of 24 (Kessler et al., 2005; Kirwan et al., 2024; Wood et al., 2017).

In this context, the relationship between gratitude and well-being becomes particularly relevant. There is a positive and significant association between gratitude and psychological well-being in emerging adults (Bali et al., 2022; Măirean et al., 2018). Gratitude is suggested as a factor that can play a crucial role in improving the well-being of individuals in this age group (Bali et al., 2022). Duprey et al.'s (2018) study linked stressful events to internalizing symptoms through mindfulness. The idea that cognitive resources mediate the relationship between stressful events and well-being supports the potential protective role of gratitude.

Given the high rates of stressful experiences during this life stage and the growing prevalence of psychopathology among emerging adults (Duprey et al., 2018), gratitude, as a cognitive resource, is associated with positive mental health outcomes. It can help manage the psychological stress specific to this developmental stage (Bali et al., 2022). Developmental transitions, which involve significant changes both on an individual level and in social roles and environments, can influence mental health and the risk of psychological disorders (Schulenberg et al., 2004). Recognizing this vulnerability is important for providing adequate support and interventions (Wood et al., 2017).

Gratitude-based interventions, such as writing gratitude journals or verbal expressions of gratitude, are easy to implement (Davis et al., 2015) and can be integrated into educational or community-based programs aimed at emerging adults. These interventions may serve as valuable tools for promoting mental health in universities or other educational settings.

3. Method

The study selection process included in this research was carried out according to the PRISMA methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), ensuring rigor and transparency in the identification and screening phases of the academic literature. For the search of scientific articles, the PubMed and Web of Science databases were used, as they are recognized for the quality of the academic publications they include. These two databases were chosen based on criteria of scientific relevance (they mainly include peer-reviewed articles), international recognition (they are the most frequently used databases in systematic reviews and meta-analyses), and broad thematic coverage (offering access to research in psychology, education, social sciences, etc.).

The following keywords were applied to the title and abstract of the articles: gratitude OR grateful OR thankful* OR bless* OR "gratitude intervention*" AND wellbeing OR "well-being" OR "well being" OR "psychological well being*" OR "subjective well being*" OR "happiness" AND student* OR college OR university OR undergrad* OR "emerging adult*" OR "young adult*". This resulted in 171 articles from PubMed and 515 from Web of Science, totaling 686 articles.

Next, inclusion and exclusion criteria were applied using the databases' automated tools. Inclusion: studies published in English, within the last 10 years. Exclusion: review articles, meta-analyses, book chapters, or non-peer-reviewed documents. After these filters, 135 articles (27 from PubMed and 108 from Web of Science) were automatically marked as ineligible. Following the removal of duplicate entries (135), the total number of eligible articles was 416. Based on title and abstract evaluation, 132 articles were selected for full-text reading. Of these, 14 articles were inaccessible in full text, despite legitimate academic access attempts (via Google Scholar, ResearchGate, university library, and contacting the authors). These were excluded from the final analysis. The final number of articles included in the systematic review was 17. Inter-rater agreement was high, with a concordance rate of over 90%.

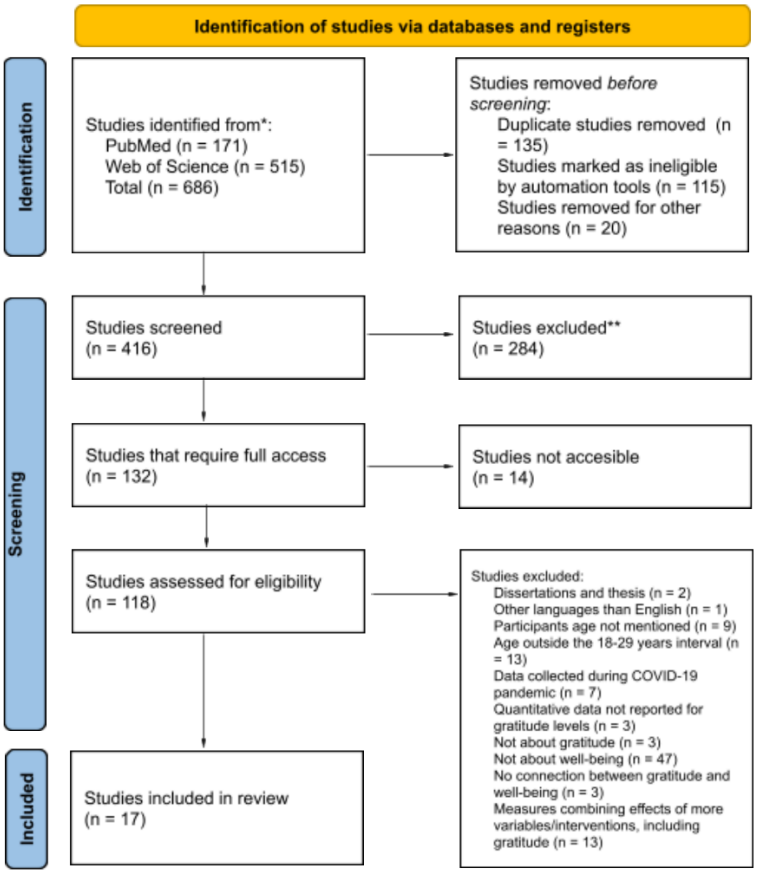
The following inclusion criteria were used to determine final study eligibility: the average age of participants had to be between 18 and 29 years, corresponding to the stage of emerging adulthood; the study had to explicitly focus on gratitude or include it as a variable in a positive psychology intervention, with separately reported results for gratitude; a direct relationship had to exist between gratitude (independent variable) and well-being (dependent variable); studies had to quantitatively measure

gratitude using psychometric scales, enabling direct comparison of results.

Only studies addressing general well-being were included, specifically: (a) Subjective/hedonic well-being (represented through a composite score including life satisfaction, positive and negative affect); (b) Psychological, social, emotional, eudaimonic well-being, and the PERMA model.

Figure 1

PRISMA flow diagram



This focus was chosen because general well-being encompasses multiple components, offering a more comprehensive view. Studies that focused on only certain aspects of well-being (e.g., just life satisfaction or only affect) were excluded. Additionally, studies that did not compose a subjective well-being score from life satisfaction and affective measures were excluded. Also excluded were studies where gratitude or well-being acted as a mediator or moderator, as the aim was to investigate the direct relationship between the two constructs; Studies conducted during the COVID-19 pandemic (considered March 11, 2020 – May 5, 2023, according to WHO), due to the psychological functioning in crisis contexts being fundamentally different, marked by instability, social isolation, and major changes; Case studies, dissertations, and doctoral theses, as the goal was to include only peer-reviewed articles to ensure high quality in the systematic review; Studies that did not report the average participant age, or where the average age exceeded 29 years. The entire selection process is visually summarized in the PRISMA flow diagram (Figure 1), highlighting the stages of the process and reasons for article exclusion.

4. Results

The 17 selected articles cover a variety of methodologies and international samples, offering a diverse perspective on gratitude and well-being. These studies include quantitative, cross-sectional, correlational, longitudinal, and experimental research, conducted in China (5 studies), Canada (1), India (1), South Africa (1), Taiwan (3), Romania (2), Poland (1), Austria (1), USA (1), and Turkey (1). The average age of participants ranges from 18 to 29 years (minimum mean age: 18.96; maximum mean age: 24.83), reflecting the age range specific to emerging adulthood. The studies addressed various types of gratitude—as a state, trait, practice, emotion, or character strength. Additionally, they explored the frequency of expressing gratitude, what people are grateful for, to whom, and the effects of gratitude on well-being. Among the instruments used to measure gratitude, we identified: Gratitude Questionnaire (GQ-6) (McCullough et al., 2002), consisting of 6 items (Zhang et al., 2022); 5-item Gratitude Questionnaire (GQ)—an adapted version of GQ-6 for the Chinese population by Chen et al. (2008) (C. Lin, 2015a); Gratitude, Resentment and Appreciation Test – Short Form (GRAT-SF) (Watkins et al., 2003; Măirean et al., 2018); Inventory of Undergraduate Gratitude (IUG) (Lin & Yeh, 2011), which includes 5 dimensions: gratitude toward others, gratitude toward God, appreciation of what one has, awareness and appreciation of hardship, and joy in the present moment (C. Lin, 2015b); VIA-120 Character Strengths Inventory (Institute on Character, 2014), developed by Littman-Ovadia (2015) from the original 240-item version (Hausler, Strecker et al., 2017); Gratitude Scale (Kardas & Yalçin, 2019) — 25 items grouped into 6 dimensions (Kardas et al., 2019); Gratitude Adjective Checklist (Emmons & McCullough, 2003; Zhang et al., 2024); Gratitude Evaluation (GE-Si) (Proctor et al., 2009), a single-item assessment focusing on gratitude for life (Balgiu & Sfeatcu, 2021).

In addition to these, several studies used custom-designed scales to measure gratitude and the frequency of its expression or practice (Charzyńska, 2019;

Tolcher et al., 2022). The analyzed studies utilized the following dimensions of well-being:

Hedonic well-being (represented by subjective well-being) measured through: Satisfaction With Life Scale-SWLS (Diener, 1985; Al-Seheel & Noor, 2016); Scale of Positive and Negative Experience - SPANE (Diener et al., 2010; Zhang et al., 2022); Three subscales targeting life satisfaction, positive and negative affect (Diener, 2000; Wang, 2020); 20-item Student Well-Being Scale (Lin & Huang, 2015); Well-Being Inventory-IW (Lin, 2011) which includes life satisfaction and positive emotions (Lin, 2015b).

Eudaimonic, psychological, social, and emotional well-being measured by: Questionnaire for Eudaimonic Well-Being (QEWB) by Waterman et al., 2010 (Mason, 2019); Psychological Well-Being Scale by Ryff (1989) ("International Journal of Early Childhood Special Education", 2020); Psychological Well-Being Scale (Ryff & Keyes, 1995; Măirean et al., 2018); Flourishing Scale (Diener et al., 2010; Lin, 2015a); General Well-Being Scale (GWS) (Aldbyani et al., 2025); Mental Health Continuum – Short Form (MHC-SF) (Keyes et al., 2009; Zhang et al., 2022).

General well-being measured through: World Health Organization Well-Being Index (WHO-5) (Tolcher et al., 2022); Comprehensive Inventory of Thriving (CIT; Su et al., 2014; Hausler, Huber et al., 2017), a 54-item instrument that includes both SWB (life satisfaction, positive and negative affect) and PWB (based on Ryff's model, 1989) (Hausler et al., 2017); Short Warwick–Edinburgh Mental Wellbeing Scale (SWEMWBS) (Fung, 2024).

In Table 1, we synthesized the main characteristics of the analyzed studies, such as study type, sample, type of gratitude, targeted dimensions of well-being, and the relationships identified between gratitude and well-being. This table serves as a starting point for the subsequent discussion, aimed at clarifying and highlighting the relationship between gratitude and well-being among emerging adults.

Table 1

Conclusions of selected articles about the connection between gratitude and well-being

Study	Study Type	Sample (n, gender, age, countries)	Gratitude Type	Gratitude Measurement	Well-being Type	Effect Size
Aldbyani et al. (2025)	Quantitative (transversal design)	1766 students, 39.52% male, 60.48% female, average age 20.08 years, age range: 18-22 years, China 325 students, 45.85% male, 54.15% female, average age 19.29 years, age range: 18-30 years, Romania 765 students, 36.2% male, 63.8% female, average age 20.53 years, Poland	trait	GQ-6 (Chinese version)	psychological well-being	$\beta = 0.66$, $p < 0.05$ $r = .58$, $p < 0.01$
Balgiu & Sfeatcu (2021)	Quantitative (transversal design)		N/A	Through a single item	subjective well-being (satisfaction with life, positive and negative affects)	$\beta = 0.34$, $p < 0.01$ $r = .46$, $p < 0.01$

					emotional, social, psychological well-being	
Charzyńska (2019)	Quantitative (transversal design)		trait	Through a unique item for each form of gratitude (gratitude towards mother, etc.)		Emotional state: M3 = 13.25, Wald = 47.90; Social: M3 = 18.23, Wald = 52.28; Psychological: M3 = 25.38, Wald = 26.84, $p < 0.001$
Fung (2024)	Quantitative (transversal design)	903 participants, 12.29% male, 87.71% female, average age 20.56 years, China	trait	GQ-5 (Chinese adapted version of GQ-6)	hedonic and eudaimonic well-being	$r = 0.32$, $p < 0.001$
Hausler, Strecker, et al. (2017)	Longitudinal	117 students, 34% male, 66% female, average age 20.3 years (at T1), 21.4 years (at T2), Austria	trait	VIA-120 (German version with 120 items)	subjective well-being (satisfaction with life, positive and negative affects), psychological well-being	Subjective well-being: T1: $r = 0.45$ T2: $r = 0.27$ Psychological well-being: T1: $r = 0.48$ T2: $r = 0.41$ $p < 0.01$
Kardas et al. (2019)	Quantitative (transversal design, correlational)	510 students, 29.60% male, 70.40% female, average age 21.5 years, age range: 17-30 years, Turkey	N/A	Gratitude Scale (Kardas & Yalcin, 2019)	psychological well-being	$r = 0.596$, $p < 0.01$
Lin (2015a)	Quantitative (transversal design, correlational)	235 students, 38.29% male, 61.71% female, average age 20.04 years, Taiwan	trait	GQ (Chinese form of GQ-6, with 5 items)	psychological and social well-being	$\beta = 0.51$, $p < 0.001$
Lin (2015b)	Quantitative (transversal design)	750 students, 35.2% male, 64.8% female, average age 20.31 years, age range: 18-22 years, Taiwan	trait	IUG	subjective well-being (satisfaction with life, positive affects)	$\beta = 0.43$, $p < 0.001$
Lin Huang (2015) (Study 2)	Quantitative (transversal design, correlational)	1260 students, 45.1% male, 54.9% female, average age 21 years, age range: 19-25 years, Taiwan	trait	GRAT (Chinese short form with 18 items)	subjective well-being	$r = 0.65$, $p < 0.00$

Măirean et al. (2018)	Quantitative (transversal design)	135 students, 24.40% male, 75.60% female, average age 21.35 years, age range: 20-35 years, Romania	trait and state	GRAT - short form	psychological well-being	lack of feeling of deprivation: $\beta = 0.94$, $p < 0.001$ AS: $\beta = 0.08$, $p = 0.714$ AC: $\beta = 0.74$, $p = 0.023$
Mason (2019)	Quantitative (descriptive design, correlational)	198 students, 30.31% male, 69.69% female, average age 20.04 years, South Africa	affect	GQ-6	psychological and social well-being, eudaimonic well-being, subjective well-being	$r = 0.41$, $p < 0.01$ $r = 0.44$, $p < 0.01$ $r = 0.54$, $p < 0.01$
Pragyendu et al. (2022)	Quantitative (transversal design, descriptive, correlational)	146 students, 45.20% male, 54.80% female, average age 20.63 years, age range: 18-24 years, India	trait	GQ-6	psychological well-being	$\beta = 0.36$, $p < 0.01$, $r = 0.345$, $p < 0.01$
Tolcher et al. (2022)	Experimental	T1: 132 students, 25.75% male, 74.25% female, T2: 108 participants, 24.07% male, 75.93% female, mean age 19 years, age range: 18-24 years, Canada	N/A	GQ-6, a question about the frequency of practicing gratitude	general well-being	Gratitude journal: $d = 0.60$, $p < 0.01$ Reflecție: $d = 0.37$, $p < 0.05$ Reflection through mobile app: $d = 0.87$, $p < 0.05$
Wang (2020)	Quantitative (transversal design)	481 students, 56.96% male, 43.04% female, average age 18.96 years, age range 17-20 years, China	trait	GQ-6	subjective well-being (satisfaction with life, positive and negative affects)	$\beta = 0.25$, $p < 0.01$
Zhang (2019) Study 2	Study 2: Quantitative (transversal design, correlational)	392 students, 24.1% male, 75.9% female, average age 24.83 years, USA	trait	GQ-6	subjective well-being (satisfaction with life, positive and negative affects)	$\beta = 0.14$, $p < 0.05$
Zhang et al. (2024)	Quantitative (daily journal design)	243 students, 9% male, 91% female, average age 19.12 years, China	trait and state	GQ-6, GAC	psychological well-being (eudaimonic)	$r = 0.346$, $p < 0.001$

Zhang et al. (2022)	Quantitative (daily journal design)	363 participants, 15.42% male, 84.58% female, average age 19.77 years, age range: 17-27 years, China	trait and state	GQ-6, GAC	hedonic well-being (satisfaction with life, positive and negative affects), eudaimonic well-being (psychological)	hedonic well-being: β = 1.879, d = 2.200 (GQ-6) β = 1.772, d = 2.231 (GAC) eudaimonic well-being: β = 0.856, d = 1.739 (GQ-6), β = 0.814, d = 1.903 (GAC) p < 0.001

Note. GQ-6 = Gratitude Questionnaire; GRAT = Gratitude, Resentment, and Appreciation Scale; GAC = Gratitude Adjective Checklist; VIA - 120 = Values in Action Strengths Inventory; IUG = Student Gratitude Inventory; T1 = Time 1; T2 = Time 2; AS = Simple Appreciation, AC = Appreciation of Others.

The β coefficients in the "Effect Size" section report the direct relationship between gratitude and well-being.

5. Discussions

According to our analysis, the relationship between gratitude and well-being is positively associated, with gratitude being an important predictor of well-being. Surpassing inspiration, meaning in life, optimism, hope, life satisfaction, forgiveness of others, self-forgiveness, or forgiveness of situations, gratitude stands out as a strong predictor of well-being. It is positively correlated with subjective well-being, being associated with positive affect and life satisfaction, and negatively correlated with negative affect. Regarding psychological well-being, gratitude is positively associated with dimensions such as environmental mastery, purpose in life, self-acceptance, personal growth, engagement, positive relationships, autonomy, and optimism. These positive associations are also found in the case of both hedonic and eudaimonic well-being.

The relationship between gratitude and well-being is explained through several mediating variables. These include the fulfillment of basic psychological needs (autonomy, competence, relatedness), coping styles, stress factors, self-esteem, social support, positive and negative affect, and temporal perspectives (positive reflection on the past and reduced focus on negative events). However, the effect of gratitude on well-being remains significant even when these mediating mechanisms are taken into account. As for the role of gratitude as a moderator, research has not identified significant effects. Trait gratitude has not been shown to moderate the relationship between state gratitude and both hedonic and eudaimonic well-being (Zhang et al., 2022), nor has state gratitude been shown to moderate the relationship between trait gratitude and psychological well-being (Măirean et al., 2018).

Although most studies are observational, it is important to mention that gratitude-based interventions have proven effective and easy to implement among student populations. This highlights the practical potential of gratitude in psychological interventions aimed at students (Tolcher et al., 2022). Further research in this direction is needed, as this work includes only one experimental study. The literature review reveals a consistently positive association between trait gratitude and well-being. In contrast, state gratitude is less studied, which may represent a research gap. Nevertheless, state gratitude is positively correlated with both hedonic and eudaimonic well-being (Zhang et al., 2022), although further studies are needed to support these findings.

An important issue noted in this analysis—and present in some studies—is the lack of a clear conceptualization of gratitude. Some studies do not explicitly state the theoretical perspective adopted regarding the type of gratitude, which can limit the comparability and interpretation of results across studies (Balgiu & Sfeatcu, 2021; Kardas et al., 2019; Tolcher et al., 2022). In some cases, there is a mismatch between the type of gratitude being examined and the tools used for measurement. For example, some studies claim to investigate gratitude as an affect (Mason, 2019), but use the GQ-6 questionnaire, which measures gratitude as a trait (McCullough et al., 2002).

An interesting but under-researched aspect is the differential impact of gratitude on well-being depending on the target of the gratitude. Research indicates that gratitude toward family has a significant positive effect on well-being, suggesting the existence of meaningful differences depending on the "target" of gratitude. This topic deserves more detailed investigation in future research to better understand the mechanisms through which gratitude contributes to well-being. A strength of this review is the inclusion of studies from diverse cultural contexts—both Western (America, Europe) and Eastern and African. This cultural diversity provides a broader perspective and may contribute to a better understanding of how gratitude and its effects manifest in different cultural settings, which is a significant advantage for the generalizability of the conclusions. Despite the valuable contributions of the current research to the specialized literature, it also presents several limitations. The work focused on general dimensions of well-being, particularly the hedonic and eudaimonic dimensions, while well-being is an umbrella concept that can be defined and approached in various ways. For example, the physical component of well-being was not included in this approach, even though there is research showing that gratitude can positively influence physical health, including cardiovascular function (McCraty, 2004). Another limitation is the presence of only one experimental study included in this systematic review (Tolcher et al., 2022), with the rest of the research being based on participants' self-reports, which involve a high degree of subjectivity in the results. Additionally, most of the included studies have student participants, which limits the generalizability of the results to the entire emerging adult population, considering that the university phase represents only a part of the emerging adulthood experience.

As future research directions, besides those already mentioned, a systematic review is proposed that would take into account a broader definition of well-being and analyze its various components in relation to gratitude. This review could contribute to a more comprehensive perspective on the effects of gratitude on well-being. Another important aspect is that future studies should include more varied samples, representative of the entire population of emerging adults. Additionally, another research direction could explore potential new mediators in the relationship between gratitude and well-being, such as self-compassion (Wu et al., 2018) or meditation (Rao & Kemper, 2017). These directions could bring a more nuanced and comprehensive understanding of the mechanisms through which gratitude supports well-being. Given the rapid pace of technological development, expressing gratitude through photography or digital applications could be an easy way for emerging adults to experience gratitude and could have a significant impact on their well-being. This new direction is promising for future research. In this context, during the period of December 2024 – January 2025, we conducted a study that aimed to enhance student well-being through expressing gratitude via photography. Based on these results, a possible continuation of the research could involve the development of simple and accessible digital interventions tailored to the needs of students—a category often vulnerable and exposed to high levels of stress (Duprey et al., 2018).

6. Conclusions and Recommendations

This systematic review highlights the essential role of gratitude in maintaining and enhancing overall well-being—emphasizing the importance of focusing on the positive aspects of life, appreciating people and events in everyday life, interpreting events in a positive manner, recognizing the benefits received from others, feeling a sense of abundance in life, and the absence of a sense of deprivation. All these aspects of gratitude have a significant and positive influence on various dimensions of well-being, such as: Hedonic well-being (subjective well-being): life satisfaction, positive and negative affect, self-confidence, interpersonal harmony, family integrity, mental health, academic achievement; Eudaimonic well-being (psychological well-being): self-acceptance, personal growth, interpersonal relationships, engagement, meaning in life, environmental mastery, autonomy, and optimism; Social well-being.

Gratitude has been shown to be a positive predictor of well-being, with multiple mechanisms through which it acts: self-esteem, coping style, stress factors, temporal perspectives, fulfillment of basic psychological needs, social support, positive and negative affect. The people toward whom gratitude is directed also play an important role in determining well-being, with gratitude directed toward family having a particularly significant contribution.

The research presents some limitations regarding the generalizability of the results. Most studies involve student participants, while university life represents only a narrow phase within the broader period of emerging adulthood. Although the method used—systematic review—provides a broad and integrative

perspective, it may not capture all the nuances of the relationship between gratitude and well-being.

For future research directions, longitudinal and experimental studies are recommended to explore the evolution and dynamics of gratitude and well-being throughout the entire span of emerging adulthood, not just the university years. In terms of application, the results of this research can be used in the development of programs aimed at cultivating gratitude in educational and professional contexts for emerging adults. Additionally, digital applications that promote the practice of gratitude could be effective tools for supporting student well-being, a population often prone to high levels of stress.

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Student-Centered Assessment: Co-Participation, Vocational Counseling, and Educational Self-Regulation

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Student-Centered Assessment: Co-Participation, Vocational Counseling, and Educational Self-Regulation

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Abstract

This paper examines a student-centered assessment model implemented within the "School of Personal Fulfillment" pilot program, carried out in Romanian upper secondary education. The program integrates co-participation, vocational counseling, and educational self-regulation as core principles for designing assessment practices that respond to students' individual learning profiles and career interests. The study adopts a longitudinal case-study approach over two academic years, combining psychopedagogical investigation, differentiated assessment methods, coordinated planning of assessment activities, and beneficiary satisfaction questionnaires administered to students, parents, and teachers. Initial assessment and the use of the Holland interest inventory supported early vocational orientation and informed the design of individualized learning pathways. Findings indicate that involving students in the selection of assessment methods enhances autonomy, engagement, and responsibility for learning, while reducing assessment-related stress and improving overall well-being. Coordinated assessment planning across disciplines contributed to transparency and prevented student overload. The coexistence of initial, formative, and summative assessment throughout the school year enabled continuous feedback and adaptive instructional practices. The results suggest that student-centered assessment, when systematically integrated into curriculum design and supported through institutional collaboration, represents a viable and sustainable approach for promoting academic development, learner well-being, and career readiness in upper secondary education.

Keywords:
student-centered assessment, co-participation, vocational counseling, self-regulated learning, differentiated assessment, secondary education

1. Introduction

Knowing students' personalities and their level of knowledge/skills is the foundation for organizing any curriculum. Didactic assessment, along with teaching and learning, is an intrinsic component of the teaching process, providing both teachers and the primary and secondary beneficiaries of education (students and parents) with predictions and answers regarding the effectiveness of the educational act. Psycho-pedagogical investigation can be considered an opportunity to get to know students' personalities, which is fundamental for inclusive schooling and students' career guidance. Assessment is a complex process that involves verification, measurement, interpretation, and argumentation (Stan, 2001). For teachers, this is the moment when they determine the effectiveness of the teaching process by correlating official curriculum benchmarks with the training needs and individual potential of each student.

Initial testing of knowledge is important both for subsequent teaching design and for the self-reflection of education beneficiaries on their involvement in learning and self-regulation of their school and career paths. The assessment of academic results is carried out throughout the entire teaching process, with the aim of achieving functional interaction between assessment and teaching/learning processes. Dynamic assessment looks at academic results at various points during the teaching process.

2. Theoretical foundation

2.1. Student-centered assessment

Student-centered assessment is a pedagogical approach that shifts the focus from traditional, classification-oriented assessment to reflective assessment that supports the learning process. This paradigm aims to develop students' metacognitive and self-regulatory skills by adapting assessment criteria or tools to individual needs and potential. Activities such as self-assessment, peer assessment, portfolios, or guided reflections contribute to a better understanding of progress and personal responsibility (Black & Wiliam, 1998; Sadler, 1989).

Contemporary pedagogy increasingly promotes the concept of student agency, interpreted as the student's ability to actively participate in establishing the criteria, methods of implementation, and

interpretation of assessment. This involvement encourages reflection and self-regulation and becomes a learning process in itself (Nieminen et al. 2025). Student-centered assessment also contributes to the development of transversal skills, such as critical thinking, problem-solving, and collaboration, and its implementation requires institutional changes and teacher training for this purpose.

The educational technologies available to teachers offer new opportunities for implementing formative assessment through adaptive digital feedback and personalized learning, transforming assessment into a catalyst for authentic learning and personal development.

2.2. Co-participation in the educational process

Co-participation is based on the principle of democratic education, promoting the involvement of students as partners in the design, implementation, and evaluation of the educational process. This approach has its roots in socioconstructivist theory, according to which learning is a social process, mediated by interaction and collaboration (Vygotsky, 1978). In an educational context, this involves students in setting learning objectives, choosing teaching methods, and making decisions about forms of assessment.

Studies by Deci and Ryan (2000) show that active student participation in the educational process supports their need for autonomy and relatedness, leading to high intrinsic motivation. Recent research indicates that the active involvement of students in educational decisions leads to positive effects on engagement and self-efficacy (Rust et al., 2003).

To be effective, co-participation requires a paradigm shift in the teacher-student relationship, based on mutual trust, dialogue, and accountability. Practices such as teaching contracts, regular consultations, collaborative projects, and two-way feedback transform the classroom into a shared learning space, with lasting effects on students' personal and professional development.

2.3. Vocational counseling

Vocational counseling is a process of supporting individuals in exploring, choosing, and planning their educational or professional path, based on their interests, abilities, values, and opportunities. Classic theoretical models, such as Holland's theory of vocational types (1997), Super's theory of career development (1990), and Krumboltz's social learning model (1996), provide relevant insights into the factors that influence career decisions.

In the context of rapid changes in the labor market and increasing demands for adaptability, vocational counseling becomes a continuous and integrated part of the daily educational process. Recent literature highlights the importance of developing career adaptability skills and a flexible vocational identity, in line with uncertainties and multiple transitions (Hooley et al., 2024; OECD, 2025)

The integration of vocational counseling into the curriculum, the use of interactive technologies, and collaboration between school counselors, teachers, and the socio-economic environment increase the effectiveness of these interventions. Vocational counseling can provide specific guidance with the aim of making informed and conscious decisions about academic or professional futures.

2.4. Educational self-regulation

Educational self-regulation is the student's ability to deliberately coordinate their learning processes through monitoring and reflection. According to the model proposed by Zimmerman (2000), self-regulation involves three major stages: anticipation, performance, and self-reflection, with the aim of leading to autonomy in learning and adaptation to the specifics of modern education.

Bandura's (1997) self-efficacy theory emphasizes the role of self-perceived competence in mobilizing effort and maintaining persistence in academic tasks. Pintrich (2004) highlights the importance of the interaction between motivation, strategy, and context in effective self-regulation.

Research in the field of digital pedagogy highlights the fact that self-regulation is a real predictor of success in online and hybrid learning environments, with interventions based on the development of metacognition and the quality of feedback having proven positive effects on self-regulation skills (Sáez-Delgado et al., 2024; Sari et al., 2025). In high school education, where autonomy and personal initiative are already established, self-regulation consistently influences student performance and adaptability.

2.5. The "School of personal fulfillment" pilot program: a student-centered assessment model based on co-participation, vocational counseling, and educational self-regulation

The pilot program "School of personal fulfillment," carried out in Romania at the "Decebal" National College in Deva, Hunedoara county, Romania, through O.M. 4872/30.08.2022, highlights the importance of initial assessment and psycho-

pedagogical investigation in designing individual learning paths for students in the 10th grade . The Pilot Program is an innovation and a collaboration between CJRAE Hunedoara and the "Decebal" National College in Deva and was proposed for implementation through curriculum counseling activities.

This program proposes organizing Module I according to a transdisciplinary curriculum design, in which educational assessment and psycho-pedagogical investigation, using the Holland interests questionnaire, represent an alternative to the traditional approach to activities in the Romanian education system. The structure of the school year in Romania is divided into five school modules, each module ending with a school holiday. Within this project, teaching assessment and psycho-pedagogical investigation constitute a moment of self-reflection for students and reflection for parents and teachers regarding the planning of learning and teaching with the aim of facilitating preparation for future careers.

Psycho-pedagogical investigation and counseling was carried out by the psycho-pedagogical assistance office at the Hunedoara psychological assistance center. Teachers, parents, and students learned about vocational profiles by specifying occupational interests. Concurrently with the psycho-pedagogical investigation, all classroom teachers carried out initial assessment activities, correlating the knowledge test with systematic observation of behavior, projects, worksheets, oral tests, reports, and other investigation methods.

The activity was intended both to diagnose the specific knowledge acquired in previous years and to identify non-specific prerequisites for learning new material, as well as to learn about and become familiar with different assessment methods and tools. The students reflected together with each teacher on the most appropriate assessment methods for determining the level of academic achievement, and once they had made their choice, these were implemented.

The assessed/tested curriculum consisted of: initial assessment of knowledge/initial self-assessment and the creation of alternative sets/packages of assessment methods/tools, offered to the primary beneficiaries of education, to be included in the student's personal education plan and applied in modules II-V. Module I ensured the transition from the holiday period to school-type activities, without recording grades in the register.

2.5.1.The student as co-participant in the design of the assessment activity

Specialists in docimology point out the importance of student co-participation in the assessment process: "a purely objective, impersonal, and absolutely neutral assessment, i.e., an assessment without a subject, is not only impossible, but also less meaningful, less relevant, and ultimately less objective than an assessment that engages the subjectivity, values, attitudes, including or especially the personal vision of the assessor and/or the assessed (Voiculescu, 2001).

The set of assessment methods must include a variety of methods that ensure objectivity in assessment and relevance to the specific nature of the school subject, and the methods chosen by each student will be recorded in their Personal education plan. The assessment methods are proposed by each teacher and involve a combination of traditional and complementary methods. Alongside assessment, self-assessment is a constant feature of the docimological process. Each student can choose one of at least two assessment sets/packages, after being advised by teachers throughout the module on the particularities of grading and the requirements involved. (see Table I)

Through this stage, the teacher answers one of the key questions of the assessment process: How do we assess? and adds a new question to the practice of school assessment: How will students and parents be involved in the assessment process?

2.5.2. The need to plan assessment activities

Planning assessment activities for each class supports teachers by facilitating teacher-teacher and teacher-student communication and provides the answer to the question "When do we assess?" Simultaneously with the design of the instructional plan (lessons, learning units, etc.), the corresponding assessment activity will also be designed. (Cucoș, 2008) In order to avoid overburdening students with multiple tests on the same day and to facilitate communication and transparency in the assessment process within the same class, a drive document can be created, accessible to all teachers, in which, based on the calendar planning and learning unit design, teachers will set the date for the teaching assessment, after it has been previously discussed with the students in the class. The Excel document in Figure 3 is an example of this. This document can be created and managed by the school counselor and is also a way of understanding and managing the emotions and stress

specific to assessment at the level of the respective class.

With a simple click, each colleague can notify their colleagues, in each class's drive, of the date chosen for assessment during the module. The assessment periods for a class can be identified and the date or period for assessment can be set, depending on the needs of the students and the planning of other colleagues. This does not exclude communicating with students regarding the date on which the assessment activity will take place. The curriculum taught must be analyzed and correlated with the assessment methods chosen by each student

2.5.3. Differentiated teaching assessment

Conducting teaching activities within the pilot program involved prioritizing the school curriculum by emphasizing its relevance to life and career and implementing the curriculum design by utilizing Holland's theory of occupational interests (Muste & Mariș, 2024). The assessment activity was carried out by applying the set of methods chosen by the students at the beginning of the school year to all school subjects.

3. Research methodology

The research methods used in this study are a longitudinal case study, covering two school years out of the four pilot years; the self-observation method provides original, new professional information collected by the researcher, and the method of studying the official curriculum documents within the pilot program complements and completes them. The beneficiary satisfaction questionnaire provides data on direct and indirect beneficiaries, as well as on the opinion of teachers regarding the relevance of the psycho-pedagogical experiment carried out.

Hypotheses:

- ✓ Using assessment methods chosen with the participation of students and parents will increase well-being in the school.
- ✓ Making the transition from school holidays to school activities will be beneficial for students.
- ✓ Planning assessment activities reduces stress caused by school overload.
- ✓ Psychopedagogical investigation using the Holland interests questionnaire is necessary for differentiated educational planning and career guidance.

4. Results

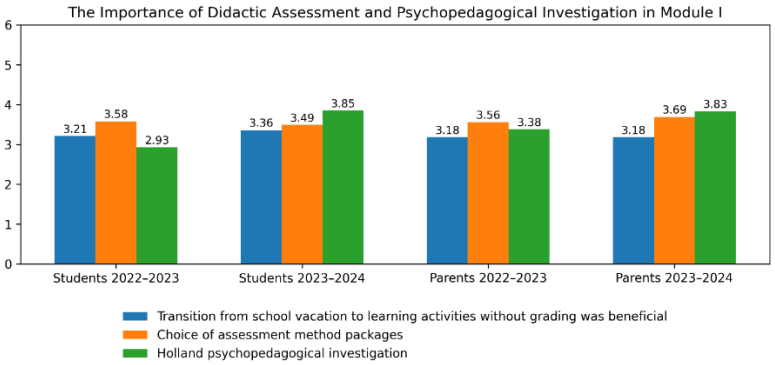
The three forms of assessment: initial, formative, and summative coexisted throughout the school year. Self-assessment methods: controlled self-grading, self-correction or mutual correction, and mutual grading were an important part of the docimological process. The assessment of academic results is carried out throughout the entire teaching process, with the aim of achieving functional interaction between assessment and teaching/learning processes.

Dynamic assessment concerns academic results at various stages of the teaching process.

At the end of Module I, a beneficiary satisfaction questionnaire was administered to the students and parents of students participating in the pilot program. Figure 1 shows the degree of beneficiary satisfaction, specified in the average of the responses for two school years, at the end of Module I, for the proposed hypotheses.

Figure 1

Assessment design and psycho-pedagogical investigation in Module I

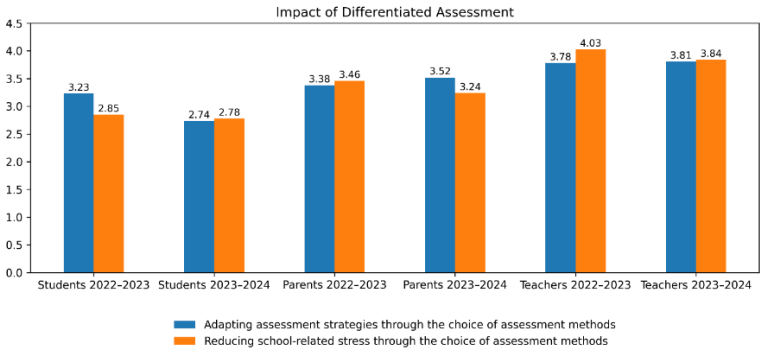


As shown in Figure 1, the direct and indirect beneficiaries of the pilot program appreciate co-participation in the design of the assessment by choosing the assessment methods. Also, the transition from school vacation to school activities, without grading students, created a sense of well-being among students. Parents and students appreciate the early psycho-pedagogical investigation, in 10th grade, for career guidance.

Figure 2 shows the satisfaction of beneficiaries and teachers' appreciation of the impact of differentiated assessment on students' well-being. As can be seen, differentiated assessment through student co-participation reduces school stress. The possibility of choosing a package of assessment methods is appreciated by all those involved in the assessment process.

Figure 2

Impact of differentiated assessment through the choice of assessment methods



As shown in Table I, N.T. and P.S. are two students who opted for different assessment methods.

Table 1

Examples of packages/sets of assessment/self-assessment methods

Student	School Subject	Set of Assessment / Self-Assessment Methods
N.T.	Romanian Language and Literature	Oral assessment, written assessment, project, portfolio, self-assessment
	Mathematics	Written assessment, project, self-assessment
	Chemistry	Written test, report, self-assessment
	Geography	Self-assessment, projects, geographical games, worksheets, practical applications, self-assessment
	Physical Education	Progress-based assessment, self-assessment
P.S.	Romanian Language and Literature	Written test, portfolio, literary essays, character analysis, self-assessment
	Mathematics	Written and oral assessment, self-assessment
	Chemistry	Oral assessment, written assessment, projects, self-assessment
	Geography	Written and oral assessment, projects, debates, practical applications, geographical games, self-assessment
	Physical Education	Speed, endurance, strength, coordination, one team sport

This has implications for the planning of the entire assessment process, and the assessment must be formative, educational, and objective. The teacher must create a creative instructional design, respecting the typology of the assessment lesson and creating moments/stages of assessment in other variants and types of lessons.

Figure 3 shows an example of assessment planning. As can be seen, assessment activities for two school subjects can be planned for the same day if one of these subjects is practical in nature and does not involve excessive workload. Planning must cover all school subjects in the framework plan and can be carried out for a school module.

Figure 3

Planning teaching assessment – activity carried out virtually and in the class teachers' council

Assessment Activity Planning – Module III, Class 10									
Subject	**09 Jan**	**10-Jo Jan**	**11-J 1 Jan**	**12 J1 Jan**	**13 J1 Jan**	**13.01 Jan**	**16.0.Jan**	**17.01 Jan**	**10.01.2023**
Romanian Language & Literature	–	–	–	–	–	–	–	–	X
	–	–	–	–	–	–	–	–	–
English Language	–	–	–	–	–	–	–	–	–
French Language	–	–	–	–	X	–	–	–	–
History of England	–	–	–	–	–	–	–	–	–
History of Germany	–	–	–	–	–	–	–	–	–
Biology	–	–	–	–	–	–	–	–	–
Physics	–	–	–	–	–	–	X	–	–
Chemistry	–	–	–	–	–	–	–	–	–
Biology	–	–	X	–	–	–	–	–	–
History	–	–	–	–	–	X	–	–	–
Geography	–	–	–	–	–	–	–	–	–
Psychology	–	–	–	X	–	–	–	–	–
Music Education	–	–	–	–	–	–	–	–	X

5. Discussions

The results of this study support the relevance of student-centered assessment as a framework that enhances learner engagement, autonomy, and well-being in upper secondary education. The positive perceptions expressed by students, parents, and teachers indicate that co-participation in assessment design contributes to greater transparency and acceptance of evaluation practices. This finding is consistent with the formative assessment perspective, which emphasizes assessment as a process that supports learning rather than merely classifying performance (Black & Wiliam, 1998; Sadler, 1989).

Allowing students to participate in the selection of assessment methods appears to reduce school-related stress and increase responsibility for learning. From a motivational perspective, this outcome aligns with self-determination theory, according to which autonomy-supportive educational practices foster intrinsic motivation and engagement (Deci & Ryan, 2000). The coordinated planning of assessment activities across disciplines further contributed to a predictable learning environment and reduced overload, confirming the importance of deliberate assessment planning highlighted in didactic literature (Cucoș, 2008).

The integration of psychopedagogical investigation and vocational counseling at the beginning of the school year strengthened the alignment between assessment practices and students' vocational interests. The use of Holland's theory of occupational interests provided a meaningful framework for reflection on future educational and career pathways (Holland, 1997), supporting differentiated instructional and assessment decisions.

Moreover, the systematic inclusion of self-assessment within the evaluation process contributed to the development of metacognitive awareness and educational self-regulation. These findings are consistent with models of self-regulated learning that emphasize the role of reflection, feedback, and perceived competence in sustaining academic effort and adaptability (Bandura, 1997; Pintrich, 2004; Zimmerman, 2000). Based on findings, the discussion confirms that student-centered assessment functions as a formative and developmental process, supporting both academic learning and personal development.

6. Conclusions

The research data support the effectiveness of a student-centered assessment model based on co-participation, vocational counseling, and educational self-regulation. The implementation of initial assessment and psycho-pedagogical investigation in Module I facilitated students' transition from the holiday period to school activities, contributing to increased well-being and reduced assessment-related stress.

The results indicate that involving students in choosing assessment methods strengthens autonomy, responsibility, and commitment to learning. Differentiated assessment, correlated with vocational interests and individual learning profiles, was positively appreciated by students, parents, and teachers. Early vocational counseling, based on the Holland interests questionnaire, supported career guidance and increased the relevance of school learning for future educational and professional paths.

Coordinated planning of classroom assessment activities reduced student overload and increased the transparency of the assessment process, promoting a predictable and balanced educational climate. The coexistence of initial, formative, and summative assessment throughout the school year allowed for continuous feedback and adjustment of the teaching approach according to the actual needs of students.

The pilot program "School of Personal Fulfillment!" demonstrates that student-centered assessment, systematically integrated into curriculum design and supported by institutional collaboration, is a viable and sustainable approach in high school education. The results highlight the importance of pedagogical flexibility, shared responsibility, and reflective practice in supporting students' academic and personal development.

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Preservice Teachers' Perceptions of Using Educational Robots in Primary School

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Preservice Teachers' Perceptions of Using Educational Robots in Primary School

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Abstract

Educational robots represent one of the most innovative developments in modern education, offering new opportunities for interactive, creative, and experiential learning. By combining programming, collaboration, and problem-solving, educational robotics helps students develop computational thinking, critical reasoning, and digital competence from an early age. In the context of 21st-century education, their integration into the instructional process supports a shift from traditional teaching toward active, student-centered learning. This study explores preservice teachers' perceptions of using educational robots in the teaching–learning–assessment process. Using a quantitative research design based on a structured questionnaire, the study examined participants' views on the pedagogical potential of educational robotics. The results reveal that future teachers perceive robots as effective tools that enhance engagement, creativity, and collaboration, while promoting competence-based and formative approaches to learning. Participants also demonstrated a strong sense of methodological preparedness and openness toward technological innovation in education. Overall, the findings emphasize that educational robotics serves not merely as a technological aid, but as a catalyst for pedagogical transformation. Integrating robotics into teacher education can help prepare future educators to design interactive, inclusive, and innovative learning experiences aligned with the needs of contemporary education.

Keywords:
educational robotics, preservice teachers, primary education, active learning, digital competence, pedagogical innovation

1. Introduction

Technology is advancing rapidly, new generations are thinking differently than they used to, and students must feel well equipped to use skills that will be applied in the 21st century. This is precisely what the modern-day education system has failed to address. Within this framework, including educational robots in learning and assessment has become an important path for innovative pedagogy. The use of educational robots in primary schools enhances the development of digital skills and logical thinking and creativity and ultimately fosters a more profound understanding of the learning process itself (Gerosa et al., 2022; Wang et al., 2022). At a school that believes in active learning and the importance of real-world experiences, robots help students learn by doing, exploring, and contemplating what they did. When children are thinking predominantly in concrete terms, which primarily occurs during their primary school years, using educational robots becomes quite necessary, as they need to learn simultaneously from many senses. Robots offer a way of turning abstract concepts in the curriculum—tour angles in mathematics, our solar system, and the mystery of logic, to name just three—into real-life experiences that are fun for kids. Educational robotics activities are found to help promote computational thinking and improve the school learning of elementary students based on recent studies (Ching & Hsu, 2023; Ouyang & Xu, 2024; Tang et al., 2025). The effects of teaching methodological training levels and teachers' attitudes on educational innovation have a direct relationship with these results (Grani, 2022). Thus, it is important to investigate the expectations of future educators regarding the use of educational robots to determine the necessary level of professional development they should receive for these pedagogical practices. The present study helps to understand future educators' conceptions of the role of robots in learning, teaching, and assessment and suggests interventions to develop university training programs suitable to the emerging needs for digital education.

2. Theoretical foundation

2.1. Educational Robots—Interactive Resources for Active Learning

One of the most exciting new developments in contemporary educational technology is called robots that can teach. They are tools that help kids learn by making them do things, contemplate what they're doing, and apply what they've learned. Robots in the

classroom are a fantastic way to educate kids, as they learn best when shown what to do and actively engaged. Kids ages 6 to 11 can play with things like Bee-Bot, Blue-Bot, Lego WeDo, Ozobot, mTiny, and Edison. These gadgets contain games that may assist in their mental and emotional development (Alimisis, 2022). So, educational robots are not the point; they're just tools to get kids to figure out how to learn math and science and Romanian and art, and civics all at the same time. In a study led by Chionas & Karampinis (2021), the inclusion of Bee-Bot in math and language classes significantly increased the attention, motivation, and academic achievement of first-graders. Kids can learn to think like computers by playing with robots that teach them to "do" things. This approach allows children to solve problems and generate algorithmic answers that machines can process (Wing, 2006). Ching and Hsu (2023) agree that showing kids how to think like a computer with robots is genius because it takes something abstract like learning to program and turns it into a hands-on, engaging activity. Educational robots may also be beneficial in teaching children how to manage their emotions as well as others. They learn to communicate, cooperate, and care for each other while programming a robot. This task makes students negotiate, solve problems, and help one another—activities stemming both from civic competences and collaboration (Alimisis & Kynigos, 2019; Demetroulis et al., 2023). Gerosa et al. (2022) and Barak & Zadok (2009) argued that through the robotics activity, kids observe themselves collaborating, continue to try out possibilities for solving problems, and want to know more.

2.2. Dimensions of the Application of Educational Robots in Primary School

We should reconsider the application of primary school education robots from three perspectives in the step-by-step process: teaching, learning, and assessment. These dimensions are interconnected to each other, and they reflect the tendency for educational robots to also become a means for first-grade pupils to develop, in addition to basic competencies and motivational and critical thinking skills (Ouyang & Xu, 2024; Tang et al., 2025). From the learning perspective, the educational robot introduces a new teaching modality that transforms the standard lesson into an experimental format, making it available as an interactive and interdisciplinary subject. The teacher can use the robot to demonstrate for students, as a simulation of doing things, or as educational games. This allows students to experience theoretical concepts in a more hands-on manner. One such is math, where a Bee-Bot can be programmed to follow a trail to solve math puzzles. This is how kids can pretend to understand sequencing and reach the right place in space. A robot in science can be a body moving, the blowing wind, or planets circling. In civic education, children may work together to program a robot to act or to traverse symbolic pathways (Demetroulis et al., 2023). Through it, students can question and thus be more motivated to learn the natural sciences. The professor is the facilitator of information, and as an intermediary between the knowledge and the learner, the robot comes closer to bringing abstraction in direct touch with reality (Alimisis, 2022). In learning, educational robots are like real buddies helping with exploring and finding new stuff. They stimulate the mind, encourage unconventional thinking, assist in problem-solving, and foster teamwork. When students play with robots, they are able to try and see what happens and then learn by doing it now-that's experiential learning (Kolb, 1984). Working as a team, sharing the load, and talking things out to get things done are skills that students can bring with them offline. These experiences help kids develop social and civic skills and also support computational thinking-like breaking down problems into logical steps and making algorithms for solving them. Students could program a bot to traverse a map or interpret a collectively created story. Thus, learning becomes more real and lively, and everyone is part of the victory, with each student contributing significantly to the team score.

Ching and Hsu (2023) found that when robots are used in a classroom, girls perform better at the learning game; they are on task more frequently, especially younger ones. Kids think this stuff is super fun. Robots provide instant feedback, so students need to plan, do, reflect - perfect for independent learning edu-robots are really cool when tailor-learning. Students can take on suitable challenges, while teachers can track their progress and offer personalized help. This system enables each student, irrespective of their pace-fast or slow-to meet the same milestones by taking a unique path. In terms of assessment, the concept of sounding like an educational robot enables new ideas about formative and real assessment. These allow data collection on the process of learning and provide immediate feedback to students, which supports self-regulation and metacognition (Wang et al., 2022). If a student programs a robot that doesn't go where they want it to, then the mistake is an opportunity to learn, rather than a cost or penalty, for example. The student

reflects on the error, corrects it, and modifies his or her algorithm. It's a beneficial way for them to take stock. The instructor can evaluate the final product, cognitive strategies, group collaborations, and students' learning attitudes. Robots can also be employed to test cross-cutting skills such as creativity, critical thinking, and teamwork through "project-based" tasks in which students work together in groups to identify a solution and then present it. Tang et al. (2025) found that when using robots in assessment, students' confidence increases and their test anxiety decreases by using feedback through a playful manner and positive tone of voice. In Romania, the E-ROBOT project (2022) demonstrates that robot assistance in assessment can also be operational at primary schools, as students are involved with "learning through play" activities in which their work needs to be constantly evaluated.

3. Research methodology

3.1 Methodology

The article employed a quantitative research approach to explore how preservice teachers perceive the use of educational robots in primary and preschool education.

To achieve the purpose of the research, the following questions were formulated:

1. What are the perceptions of teachers and future teachers regarding the integration of educational robots into the teaching process, considering the three fundamental dimensions: teaching, learning, and assessment?
2. What is the level of preparedness and awareness among future teachers concerning the use of educational robots in primary education, with an emphasis on the skills required for their effective implementation in classroom activities?
3. What is the role of educational robots in the instructional process, both as a support tool for teachers and as an innovative resource for enhancing students' learning?

The research hypotheses are as follows:

H1: Students, as future teachers, are methodologically prepared to integrate educational robots into the instructional process, being familiar with the necessary strategies for their application, including organizational forms, teaching tools, and methods.

H2: Students perceive that educational robots can be used as interactive tools in the teaching process and can be integrated into instructional activities aligned with the school curriculum.

3.2. Participants

For this study, a quantitative research method was used. The participants were students specializing in Primary and Preschool Education Pedagogy at *Lucian Blaga University of Sibiu* - preservice teachers and preschool educators. The sample consisted of 98 students from the first, second, and third years of study: 73 enrolled in the full-time (undergraduate) program and 25 in the distance learning program.

The participants varied in age, with the majority belonging to the 20-25 age group (50 participants). Additionally, 22 students were under 20 years old, 6 were between 26 and 30, and 20 were over 30 years old - some of whom were already employed in the field of education.

3.3. Data Collection

The data were collected using a five-point Likert-scale questionnaire consisting of 24 questions. Among them, 22 were closed-ended items, where participants rated their agreement on a scale from *"1 - Strongly Disagree"* to *"5 -Totally Agree"*, and three were open-ended questions (items 4, 24, and 25) that invited participants to share their own opinions on the research topic.

The questions were designed not only to capture participants' perceptions of using educational robots in the teaching process but also to assess their understanding of this process in all its pedagogical, methodological, and managerial dimensions. Students were encouraged to draw upon their theoretical and practical knowledge when responding, in order to provide well-founded views on how educational robots can be integrated into classroom activities.

The questions were divided into three dimensions, each highlighting different aspects of the topic, including both the application of new technologies in teaching and the understanding of pedagogical strategies for their implementation. Since some of the students participating in the study were already working as teachers or preschool educators, many of them had taken part in various activities organized within projects conducted by the faculty members of the Department for Teacher Training at Lucian Blaga University of Sibiu. These activities focused on the use of educational robots.

The first group of questions addressed teaching experience with educational robots (questions 1–5).

The following groups explored the impact of educational robots on the teaching process, specifically on learning (questions 6), assessment (questions 7–9), and their use in teaching (questions 10–15). The final category, considered particularly important, referred to general opinions and perspectives regarding the use of educational robots in the teaching process (questions 16–25).

4. Results

For the analysis of the data collected in the study, statistical methods appropriate to the type of variables and the purpose of the investigation were used. The analysis was conducted using the PSPP program, the open-source equivalent of SPSS.

Data analysis included the examination of kurtosis and skewness values to determine the normality of the distributions. The descriptive indicators showed that the score distribution was slightly left-skewed, within normal limits, with a skewness value of -0.71 and slightly leptokurtic, with a kurtosis value of 0.85. Both values fall within the accepted range (-2 to +2), and the standard deviation was 0.57. Therefore, the assumption of normality was considered met, allowing the application of the ANOVA test.

Descriptive indicators were calculated, showing small differences between the means (a maximum of 0.36 points). The assumptions for applying parametric tests were verified, namely the normality of distributions and the homogeneity of variances between groups, with Sig. = 0.245 (> 0.05) and Levene's Statistic = 1.43. After confirming these conditions, a one-way ANOVA test was applied (Table 1).

Table 1

The ANOVA test

Model		Sum of Squares	df	Mean Square	F	Sig.
	Between Groups	1.02	2	.51	1.59	.208
	Within Groups	30.25	95	.32		
	Total	31.26	97			

The ANOVA test, with results of F = 1.59 and p = 0.208, indicates that there are no statistically significant differences between the groups of students (based on their year of study: first, second, and third year) regarding their perceptions of the use of educational robots and digital technologies in the teaching–learning–assessment process. The results are presented and interpreted below from both a statistical and educational perspective.

The descriptive analysis shows that participants hold a generally positive perception of the idea that educational robots can be used as interactive tools in the teaching process. With a standard deviation of 0.57 (Min = 1.93, Max = 5.00, M = 3.99), it can be observed that the responses are fairly consistent across participants.

The analysis of teachers' and future teachers' perceptions by age category is presented in Table 2. The highest mean value was recorded for the group "Under 20 years" (M = 4.18), indicating a more positive perception. The other age groups showed very similar scores (M ≈ 3.8–3.9). A one-way ANOVA test was applied to examine differences between age groups regarding perceptions of the use of educational robots. The results showed that these differences were not statistically significant, F(3, 94) = 1.63, p = 0.188.

Table 2

Analysis of Teachers' and Pre-service Teachers' Opinions According to Age Group

Age	N	Mean	St. dev.	Std. Error	Min.	Max.
Under 20 years old	23	4.18	.55	.11	2.79	4.97
20-25	50	3.97	.39	.07	2.87	5.00
26-30	5	3.80	.37	.17	3.54	4.46
Over 30 years old	20	3.80	.74	.17	1.93	4.76
Total	98	3.99	.57	.06	1.93	5.00

Table 3

Analysis of Teachers' and Future Teachers' Perceptions of the Use of Educational Robots by Year of Study

Age	N	Mean	St.dev.	Std.Error	Min.	Max.
Year 1	43	4.04	.63	.10	1.93	5.00
Year 2	35	3.68	.49	.08	2.45	4.61
Year 3	20	4.12	.52	.12	3.19	4.76
Total	98	3.99	.57	.06	1.93	5.00

An analysis was also conducted based on the year of study, providing detailed results (Table 3) regarding the overall perception mean, which was highest among third-year students (M = 4.12; SD = 0.52), followed by

first-year students (M = 4.04; SD = 0.63). Second-year students recorded the lowest mean (M = 3.68; SD = 0.49). To verify whether the general perception differed significantly by year of study, a one-way ANOVA test was applied. The results indicated that the differences between the means of the three groups were not statistically significant, F(2, 95) = 1.59, p = 0.208. Therefore, it can be concluded that the year of study does not have a significant influence on students' perceptions of the use of educational robots in the instructional process.

The descriptive statistics analysis highlights a high level of agreement among participants regarding the use of educational robots in teaching, learning, and assessment activities (Table 4). The mean values, ranging from M = 3.92 to M = 4.14, indicate a generally positive perception of their role in the educational process. The moderate standard deviations (SD = 0.67–0.74) suggest a relatively homogeneous pattern of responses.

The distributions show a slight negative skewness (Skewness = -0.21 to -0.98), confirming a tendency among respondents to give higher ratings (partial or total agreement). The kurtosis values indicate a greater concentration of responses for the teaching and learning dimensions, and a slightly higher dispersion for assessment, reflecting a generally positive but not unanimous openness toward integrating educational robots into the evaluation process.

Table 4

Perception of the Influence of Educational Robots on the Teaching, Learning, and Assessment Process of Students

	N	Mean	Min	Max	Skewness		Kurtosis		Std. Dev.
					Statistic	Std. Error	Statistic	Std. Error	
Teaching dimension	98	3.92	1.55	5.00	-.94	.24	1.50	.48	.67
Learning dimension	98	4.14	1.00	5.00	-.98	.24	1.93	.48	.74
Assessment dimension	98	3.93	2.03	5.00	-.21	.24	-.59	.48	.69

The Pearson correlation analysis (Table 5) revealed positive and statistically significant relationships among all the dimensions of the educational process examined. The overall perception of using educational robots was strongly correlated with the teaching dimension (r = 0.933, p < 0.001) and with the assessment dimension (r = 0.899, p < 0.001). Likewise, perceptions of the influence of robots on the learning process showed positive and significant correlations with the other dimensions (r = 0.503–0.669, p < 0.001).

These results indicate a high level of attitudinal coherence among participants, suggesting that educational robots are perceived as useful and complementary tools across all stages of the instructional process-teaching, learning, and assessment.

Table 5

Pearson Correlations Between the Dimensions of the Educational Process

		All Questions	Learning dimension	Learning dimension	Rating Dimension
All questions	Pearson Correlation	1.000	.629*	.899*	.933*
	Sig. (2-tailed)		.000	.000	
Teaching dimension	Pearson Correlation	.669	1.000	.629*	.503
	Sig. (2-tailed)	.000		.000	.000
Learning dimension	Pearson Correlation	.899	.629*	1.000	.792
	Sig. (2-tailed)	.000	.000		.000
Assessment dimension	Pearson Correlation	.933*	.503*	.792*	1.000
	Sig. (2-tailed)	.000	.000	.000	
N		98	98	98	98
*. Correlation is significant at the 0.05 level					

5. Discussions

The study revealed a generally positive perception among students specialising in Primary and Preschool Education regarding the integration of educational robots into the teaching process. The high mean values for the two hypotheses (M_IP1 = 3.92; M_IP2 = 4.00) indicate an interaction between the motivation shown by future teachers, a satisfactory level of methodological preparedness, and a genuine openness toward the use of modern educational technologies in teaching, learning, and assessment activities.

The high coefficient of internal consistency (α = 0.93) for H1 confirms that students perceive themselves as methodologically prepared to integrate educational robots into the teaching process. This finding also suggests that future teachers show a willingness to adapt technology to the instructional context—a tendency associated with familiarity with interactive teaching methods and the use of technological tools during their university training.

At the same time, the positive perception reflects the belief that the use of robots can diversify traditional teaching methods and support students' active learning, addressing the core competencies outlined in the school curriculum. This result is consistent with the studies of Gerosa et al. (2022), Ching and Hsu (2023), and Demetroulis et al. (2023), which showed that educational robots foster computational thinking, collaboration, and discovery-based learning.

The present study revealed, for H2, a mean value of 4.00 and very good reliability ($\alpha = 0.87$), confirming a positive association regarding the potential of educational robots as interactive tools compatible with the requirements of the school curriculum. Students consider that robots can be successfully used in teaching and assessment activities, contributing to increased motivation and enhanced student engagement. This perception aligns with recent research (Ouyang et al., 2024; Tang et al., 2025; Wang et al., 2022), which highlighted the positive impact of educational robots on the engagement and performance of primary school students.

There are no statistically significant differences between student groups (ANOVA analysis, $p > 0.05$) regarding perceptions of methodological preparedness and the usefulness of educational robots. This homogeneity of responses can be explained by the uniform nature of university training and the similar access to educational and technological resources within the study program. The results confirm that a positive attitude toward technological innovation does not significantly depend on the year of study but represents a shared characteristic among future teachers.

The strong correlation identified between two important dimensions ($r = 0.754$, $p < 0.001$) is particularly significant: the awareness of pedagogical preparedness, from a methodological standpoint, and the inclusion of educational robots in the process of applying theoretical knowledge. This indicates that the perceived level of methodological preparedness is directly proportional to the perception of the usefulness of educational robots. In other words, students who consider themselves more competent in terms of teaching skills also tend to show a more favourable attitude toward the use of robots in teaching and learning activities.

This result supports the conclusions drawn by Johnson et al. (2016), Demissie et al. (2021), and Granić (2022), who found that solid pedagogical preparation and digital competence are key factors in the acceptance and integration of emerging technologies in education.

Overall, the data obtained confirm the formulated hypotheses and highlight a significant relationship between methodological preparedness and openness to educational innovation. It is worth noting that this study identifies a meaningful influence on participants' acceptance of instructional modernisation through technology. This suggests that both initial and ongoing teacher training should include specific components related to the use of educational robots—not only as technical resources but also as pedagogical tools for developing students' critical thinking, collaboration, and creativity.

6. Conclusions

The results of this study indicate that educational robots in primary education are not only possible but also a highly recommended resource, according to trainee teachers. Experiences with robotic technologies were also reported to be of instructional interest to future teachers, with both methodological preparation and attitudes towards the use of educational robots being raised. The average scores for all three dimensions (teaching, learning, and assessment) suggest a consistent belief in educational robots as a useful cognitive artifact for achieving interactive, experiential learning and promoting competency-based teaching. This belief points out the advantages of integrating such technologies into modern classrooms. By fostering a collaborative environment, educational robots can enhance engagement and provide personalized learning experiences that cater to diverse student needs.

There were no statistically significant differences between study years or student ages, which means that all of the participants were equally aware of and open to using technology. Additionally, the strong interrelationships between the three dimensions of the educational process highlight that the use of educational robots is considered a comprehensive teaching model to improve learning effectiveness, accelerate learners' motivation to learn, and promote formative and authentic assessment.

Although the study brings value to the field, it also has certain limitations. Firstly, the study sample was minimal and localized—the students were from a single university-which could limit the generalizability of the results. Secondly, this study was based on participants' self-reported perceptions rather than direct classroom observations, which are

subjective and open to interpretation. Consequently, a future study should include both pre-service and in-service teachers from various schools with different educational levels.

The research concludes that educational robotics should play a central role in contemporary teacher training programs. By developing digital skills and a positive attitude towards innovation, future teachers can be better prepared to implement interactive, inclusive, and creative learning environments, in line with the requirements of 21st-century education.

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‘’Mirror of the Mind’’ – Exploring Mentalization Across Parents of Typically and Atypically Developing Children

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''Mirror of the Mind'' – Exploring Mentalization Across Parents of Typically and Atypically Developing Children

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Abstract

The present study investigated parental mentalization and examined its main psychological predictors in parents of typically and atypically developing children. Using a cross-sectional, correlational design, we focused on identifying individual difference variables that account for variability in parental mentalization. A total of 182 parents participated in the study and completed a battery of self-report measures, including the Self-Regulation Questionnaire (SRQ), the Perceived Competence Scale (PCS), and the Parental Reflective Functioning Questionnaire (PRFQ), which was used as an index of parental mentalization. In addition, parents were asked to describe their child, and their use of mental descriptors (e.g., references to thoughts, feelings, and intentions) was coded as an observable indicator of mentalizing about the child. Group comparisons showed that parents of typically developing children used significantly more mental descriptors when characterizing their child than did parents of atypically developing children, suggesting lower levels of spontaneous mentalization in the latter group. Regression analyses further indicated that perceived competence and the degree of external control in self-regulation emerged as significant predictors of parental mentalization across both groups. Specifically, higher perceived competence and lower reliance on external control were associated with higher levels of parental mentalization. These findings highlight the role of self-regulatory processes and perceived competence in shaping how parents think about and make sense of their children's internal states, with potential implications for interventions targeting parental reflective functioning in both typical and atypical developmental contexts.

Keywords:
atypical development, parental mentalization, perceived competence, self-regulation, typically developing children

1. Introduction

According to the existing literature, mentalization represents the capacity to recognize the bidirectional relationship (Schwarzer et al., 2021; Sprecher et al., 2023) between the internal and external components of behavior (Locati et al., 2025; Miller et al., 2022). It can also be conceptualized as the ability to interpret one's own and others actions as the externalized patterns of mental states (Pitzen et al., 2025).

Parental mentalization is being described as a reflective process that allows the parent to interpret the contextual experiences from their child's personal approach (Aldrich et al., 2021; Gagné et al., 2023) and react properly to the child's needs as a result of the process (Álvarez et al., 2022). Research findings revealed that parental mentalization is a key predictor of the attachment between the parent and the child (Barlow et al., 2021; Dollberg, 2022; Larkin et al., 2021). Additionally, parental mentalization has been considered to play a crucial role in the development of children's executive functions (Aldrich et al., 2021). Furthermore, recent findings acknowledge the role of parental mentalization in the development of children's socio-emotional competencies (Ghanbari et al., 2023).

2. Theoretical foundation

2.1. Parental mentalization and the Self-Determination Theory

The conceptual framework of the Self-Determination Theory (SDT) has been developed by Ryan & Deci (2020) and addresses the question of motivation as an inner drive underlying behavior. A hypothesized connection has been outlined between the motivational drive described in SDT (Ryan & Deci, 2019) and the predisposition of parents to mentalize (Casale et al., 2023), both considered as inner dynamics that shape the narrative of behavioral manifestations (Ryan et al., 2019). Three central components have been defined as the essence of Self-Determination Theory, namely, the basic psychological needs for autonomy, competence and relatedness (Ryan & Deci, 2019). Autonomy refers to the need for self-coordination and self-reliant decision making (Goodman et al., 2021). Relatedness can be described as the need for stable interpersonal

relationships characterized by warmth, trust, mutual respect and commitment (Smorti et al., 2022). Competence indicates the need for self-efficacy (Hashemi & Einy, 2021), the perception and awareness that one has the potential to reach desired goals, relying on their own abilities (Smorti et al., 2022). Synthesizing the core elements of Self-Determination Theory (Ryan et al., 2019), it has been suggested that the fulfillment of basic needs proposed by (Ryan & Deci, 2020) could lead to an inner consistency providing the motivational drive for parents to mentalize (Casale et al., 2023).

As a result of analyzing the associations presented above, recent findings (Gagné et al., 2021; Goodman et al., 2021; Smorti et al., 2022) highlighted the relevance of the need for autonomy and competence in the context of parental mentalization. In this respect, the tendency to explore and understand the child's mental states has been considered to be the manifestation of the parent's inner balance based on the sense of competence and autonomy (Hashemi & Einy, 2021; Gagné et al., 2023).

2.2. Parenting children with special needs: difficulties of mentalization

It was proposed that parents of children with special needs would be more vulnerable to experience a decreased level of perceived autonomy and competence (Ballespí et al., 2021; Antwi, 2023), therefore they may face difficulties when interpreting their children's internal states (Gur et al., 2023).

Recent studies (Desimpelaere et al., 2023; Antwi, 2023) indicate that parenting a child with special needs is highly associated with significant challenges faced by parents, regarding the fulfillment of the child's needs (Young et al., 2020), the provision of necessary health care services (Shattnawi et al., 2021), coping with behavioral and/or emotional manifestations of the disability, as well as the probability of financial worries as a result of the wide spectrum of treatments and interventions needed (Larkin et al., 2020). Constantly occurring challenges faced by parents may lead to a perception of incompetence (Young et al., 2020) and low parental self-esteem (Larkin et al., 2021; Antwi, 2023).

Farkas et al. (2018) intended to explore parental experiences in the sample of children with disabilities, compared to parents of neurotypical children. Parents of children with disabilities described significantly more difficulties and a subjective perception of lacking control, while these experiences have not been reported by parents of typically developing children. Difficulties presented by parents point to the conclusion that challenging experiences may be associated with a decreased level of perceived autonomy (Goodman et al., 2021).

Lee et al. (2022) have also broadened the existing knowledge about the satisfaction of basic psychological needs (Ryan & Deci, 2019) in parents of children with disabilities. In their exploratory study, it has been found that the most common parental experiences are helplessness, the feeling of incompetence and an inner ambiguity due to the unpredictable manner of challenges that makes parents feel out of control. Moreover, the study conducted by Chen et al. (2023) was analyzing the frequency of psychological problems in parents of children with special needs. The study was carried out with the participation of 4935 parents. It has been found that parents of children with disabilities had a significantly higher tendency for psychological problems to occur, compared to parents of typically developing children.

In summary, it has already been clarified that parents of children with special needs are being exposed to a wide range of factors increasing the possibility of experiencing low parental self-esteem (Ballespí et al., 2021) and the lack of autonomy (Farkas et al., 2018). In the context of the Self-Determination Theory, it has also been suggested that these experiences may influence parents' representations of their children's inner worlds (Chen et al., 2023; Gur et al., 2023; Larkin et al., 2021), these representations being predominated by their concerns associated with the children's special needs (Larkin et al., 2020; Smorti et al., 2022; Desimpelaere et al., 2023). However, there is a research gap regarding the investigation of the relationship between basic psychological needs and the ability of mentalization in the case of parents of children with special needs.

3. Research methodology

3.1. Aims of the Present Study

The current study aims to close the aforementioned research gap by: (a) addressing the differences in mentalization between the group of parents of typically and atypically developing children and (b) investigating the predictive role of parental autonomy and competence on the ability of parents' to mentalize in the population of typically and atypically developing children. Two research questions were addressed:

Q1 – Is there a significant difference between parents of typically developing children and parents of

atypically developing children regarding their ability to mentalize? Based on the results presented by Farkas et al. (2018) and Ansari et al. (2020), we hypothesized that parents of children with special needs will reach a lower level of mentalization compared to parents of typically developing children, indicated by the reduced number of mental descriptors used when characterizing their children. We also expected that the self-rated level of parental reflective functioning will be lower in the group of parents of children with special needs in comparison to parents of typically developing children.

Q2 – Do basic psychological needs (i.e. perceived autonomy and competence) predict self-reported parental mentalization? Based on the result presented by Larkin et al. (2020) and JongSik et al. (2023), we hypothesized that perceived autonomy and competence will predict the self-reported level of parental mentalization across both groups.

3.2. Participants

A total number of 182 parents participated in our study. Two groups have been formulated based on demographic characteristics: parents of typically developing children (n=93) and parents of atypically developing children (n=89). Table 1 presents demographic data of participating parents and their children.

Table 1

Demographic characteristics of parents and children

	Total (N=182)	Parents of typically developing children (n=93)	Parents of atypically developing children (n=89)
Parent's age (years)	41.13 ± 8.40	38.45 ± 7.89	43.93 ± 8.03
Child's age (years)	12.06 ± 7.88	9.85 ± 6.42	14.37 ± 8.62
Sex of parent			
Male	10 (5.5%)	7 (7.5%)	3 (3.4%)
Female	172 (94.5%)	86 (92.5%)	86 (96.6%)
Sex of child			
Male	104 (57.1%)	44 (47.3%)	60 (67.4%)
Female	78 (42.9%)	49 (52.7%)	29 (32.6%)
Marital status of the parent			
Single	5 (2.7%)	-	5 (5.6%)
In a relationship	9 (4.9%)	3 (3.2%)	6 (6.7%)
Married/Living with a partner	152 (83.5%)	87 (93.5%)	65 (73.0%)
Divorced	14 (7.7%)	2 (2.2%)	12 (13.5%)
Widow	2 (1.1%)	1 (1.1%)	1 (1.1%)
Educational level of the parent			
Primary school	10 (5.5%)	5 (5.4%)	5 (5.6%)
Vocational secondary school	27 (14.8%)	10 (10.8%)	17 (19.1%)
Academical secondary school	60 (33.0%)	23 (24.7%)	37 (41.6%)
Post-secondary education	85 (46.7%)	55 (59.1%)	30 (33.7%)
Socio-economic status of the family			
Low	13 (7.1%)	5 (5.4%)	8 (9.0%)
Medium	157 (86.3%)	80 (86.0%)	77 (86.5%)
High	12 (6.6%)	8 (8.6%)	4 (4.5%)

Note. Mean ± SD are used to present continuous variables. Categorical variables are presented by frequencies and percentages.

3.3. Measures

3.3.1. Treatment Self-Regulation Questionnaire

We developed an adaptation of the Treatment Self-Regulation Questionnaire (TSRQ) originally used by Ryan & Connel (1989) in order to address the type of motivation underlying caregiving behavior. The adapted version consists of 9 domain-specific items translated into Hungarian and assesses the degree to which a parent's caregiving behavior is being determined by self-regulated motivators. The items are rated on a 7-point Likert scale and the questions are divided into two subscales: autonomous the controlled form of self-regulation. Recent studies presented TSRQ as a valid and reliable instrument for the investigation of regulatory styles, its Cronbach's alpha coefficient being 0.82 in the research conducted by Ishii et al. (2022).

3.3.2. Perceived Competence Scale

Perceived Competence Scale (PCS) is a 4-item questionnaire introduced by Williams & Dec (1996) in

order to assess one of the fundamental constructs presented in the Self-Determination Theory. Regarding the internal consistency of the questionnaire, recent studies show an adequate tendency as reported by Yoon & Choi (2019) where the Cronbach's alpha coefficient was 0.96. In the current study, a Hungarian adaptation of the PCS has been developed with the aim of assessing the perceived competence of parents. Four domain-specific items have been formulated, based on the original version of PCS. A Likert scale was used to rate all of the four items ranging from 1 (''not at all true) to 7 (''very true'').

3.3.3. Parental Reflective Functioning Questionnaire

Parental Reflective Functioning Questionnaire (PRFQ) is an 18-item instrument developed by Luyten et al. (2017) with the aim of assessing parents' ability to discover and understand their child's mental states. It consists of three subscales: (a) Pre-Mentalizing Modes of Mental States (PMM), which examines difficulties faced by parents when interpreting inner states underlying their child's behavior, (b) Certainty about Mental States (CMS), which measures the parent's perceived certainty regarding their interpretations of the child's thoughts, feelings and intentions, (c) Interest and Curiosity in Mental States (IC), assessing the parent's willingness to understand the child's inner states. Luyten et al. (2017) reported an optimal internal consistency, the Cronbach's alpha coefficient being 0.70 for PMM, 0.82 for CMS and 0.75 for IC.

3.3.4. Representational measure of parental mentalization

The representational measure of parental mentalization, developed by Meins et al. (2001), is an interview-based approach used for the investigation of a parent's capacity to represent his/her child in the context of internal states, including thoughts, emotions, intents and desires. The following instruction is given to the participants: ''Please describe your child!'', highlighting that there are no correct or incorrect answers. According to the coding procedure presented by Meins & Fernyhough (2015), four categories can be formulated for the examination of the responses: (a) mental descriptors, (b) behavioral descriptors, (c) physical descriptors, (d) general characteristics. Using the representational approach in the population of parents of children with disabilities, a fifth category of symptomatology has also been formulated, as an indicator of descriptors referring to the child's special needs.

The scoring procedure includes the calculation of frequencies of responses coded into each of the categories. By dividing the number of mental state descriptors with the total number of descriptors, a proportional score is formulated referring to mental characteristics. A higher proportional score outlines a higher level of mentalizing capacity. Recent studies presented this measure as a reliable way of examining parental mentalization, as also highlighted in the study of Ansari et al. (2020), where the Cohen's kappa indicating inter-rater reliability was k = .82.

3.4. Procedure

Hungarian-speaking parents of typically and atypically developing children were contacted via social media platforms, schools and special education centers to participate in our study. Parents who agreed to voluntary and anonymously participate, completed our questionnaires.

3.5. Design and Data Analyses

A cross-sectional correlational design was used for assessing the predictive value of perceived autonomy and competence on parents' ability to mentalize. Preliminary analyses were conducted to examine the normality of the data and the internal consistency of scales and subscales used for further analyses. As presented in Table 2, the skewness and kurtosis values are between -2 and +2, indicating an acceptable distribution (Orcan, 2020) for all of the variables.

Table 2

Normality of data

	M ± SD	Skewness		Kurtosis	
		Statistic	SE	Statistic	SE
Parent's age	41.13 ± 8.40	.31	.18	.01	.35
Child's age	12.06 ± 7.88	1.23	.18	1.80	.35
Mental descriptors	2.41 ± 1.89	.92	.18	.89	.35
SRQ_CONTROL	23.04 ± 6.92	-.37	.18	-.48	.35
PCS	23.15 ± 3.74	-.81	.18	.85	.35
PRFQ_CMS	4.66 ± 1.16	-.15	.18	-.52	.35
PRFQ_IC	5.92 ± .89	-1.05	.18	1.18	.35

Note. The following scales and subscales are included: Controlled Regulation subscale of Self-Regulation Questionnaire (SRQ_CONTROL), Perceived Competence Scale (PCS) and two subscales of Parental Reflective Functioning Questionnaire: Certainty about Mental States (PRFQ_CMS) and Interest and Curiosity about Mental States (PRFQ_IC).

Cronbach's alpha coefficients of scales and subscales are presented in Table 3.

Table 3
Internal consistency of scales and subscales

	Number of items	Cronbach's alpha
PRFQ_PMM	6	.65
PRFQ_CMS	6	.75
PRFQ_IC	6	.68
SRQ_AUTONOMOUS	4	.53
SRQ_CONTROLLED	5	.71
PCS	4	.74

Note. Scales and subscales included: Pre-Mentalizing Mode (PRFQ_PMM), Certainty about Mental States (PRFQ_CMS), Interest and Curiosity about Mental States (PRFQ_IC), Autonomous Regulation (SRQ_AUTONOMOUS), Controlled Regulation (SRQ_CONTROLLED) and Perceived Competence Scale (PCS).

One subscale of Parental Reflective Functioning Questionnaire, the Pre-Mentalizing Modes of Mental States (PMM) had an internal consistency lower than 0.70, therefore we decided not to use this subscale for further analysis. The subscale of Interest and Curiosity in Mental States had an internal consistency of 0.68 corresponding with the study of Kungl et al. (2024) where Cronbach's alpha was 0.65, explained by the differences in translation. Based on the aforementioned study, we decided to use the subscale interpreting results cautiously. The Autonomous Regulation subscale of Self-Regulation Questionnaire had an α coefficient of 0.53, therefore being excluded from further analysis.

4. Results

4.1. Differences in mentalization between the groups of parents

Independent samples t-test was used to examine differences in mentalization between the group of parents of typically developing children and the group of parents of atypically developing children. An A priori power analysis of independent samples t-test has been conducted in G*Power 3.1.9.7 (Faul et al., 2007). Using medium effect size (d = 0.5), a significance criterion of 0.05 and a power of 0.90, the minimum sample size needed was 172.

Table 4 shows differences between groups based on three dependent variables: interest and curiosity in mental states (IC), certainty about mental states (CMS) and the number of mental descriptors used by parents to characterize their children.

Table 4
Differences in mentalization between the two groups of parents

	Parents of typically developing children		Parents of atypically developing children		$t_{(180)}$	p	Cohen's d
	M	SD	M	SD			
CMS	4.64	1.09	4.67	1.23	.20	.84	.02
IC	5.88	.91	5.97	.87	.66	.50	.10
Mental descriptors	3.05	1.99	1.75	1.53	-4.92	.00	.73

Levene's Test indicted equal variances across the groups regarding CMS (F = 2.99, p = 0.08), IC (F = 0.06, p = 0.79) and mental descriptors (F = 3.11, p = 0.07). A significant difference has been found in the number of mental descriptors, the group of parents of atypically developing children (M = 1.75, SD = 1.53) using significantly less mental descriptors [$t_{(180)}$ = 4.92, p<0.001, d = 0.73], than the group of parents of typically developing children (M = 3.05, SD = 1.99). No differences have been found in curiosity or certainty of parents about mental states.

4.2. Predictors of self-reported parental mentalization

Predictors of self-reported parental mentalization (i.e. CMS and IC) have been examined using hierarchical multiple regression analyses (see Table 5).

Regarding Certainty about Mental States (CMS), linearity of independent variables was tested using scatterplots which indicated linear trends. Standardized residuals were ranging between -2.84 and 2.57 and the Durbin-Watson statistic of 1.75 revealed the absence of autocorrelation in residuals. The first regression model has been found to be significant [$F_{(4,177)}$ = 3.73, p = 0.006), R^2 = 0.07]. Parent's age (β = -0.31, p = 0.01), child's age (β = 0.39, p = 0.002) and female sex of the child (β = 0.14, p = 0.04) were identified as significant predictors of CMS. The second model was also significant [$F_{(6,175)}$ = 11.51, p < 0.001), R^2 = 0.28, ΔR^2 = 0.20], predicting 20% of the variance in CMS, after controlling for

demographic variables. Perceived competence (β = 0.50, p < 0.001) was a significant predictor of CMS. Concerning Interest and Curiosity in Mental States (IC), the linearity of independent variables was also confirmed by scatterplots, standardized residuals were ranging between -3.09 and 2.08 and the Durbin-Watson statistics of 1.93 revealed no autocorrelation in residuals. The first model was significant [$F_{(4,177)}$ = 2.85, p = 0.02, R^2 = 0.06]. Parent's age (β = -0.35, p = 0.005) significantly predicted IC. The second model was also found to be significant [$F_{(6,175)}$ = 4.03, p = 0.001, R^2 = 0.09]. Parent's age (β = -0.35, p = 0.007), female sex of the child (β = 0.16, p = 0.02) and controlled regulation (β = 0.25, p = 0.001) were revealed as significant predictors.

Table 5

Predictors of self-reported parental mentalization

	Certainty about Mental States						Interest and Curiosity in Mental States					
	Model 1			Model 2			Model 1			Model 2		
	B	β	SE	B	β	SE	B	β	SE	B	β	SE
(Constant)	5.58		.54	1.23		.80	6.96		.42	6.25		.68
Parent's age	-.04	-.31*	.01	-.007	-.04	.01	-.03	-.35**	.01	-.03	-.35**	.01
Child's age	0.05	0.39**	.01	.02	.15	.01	.02	.23	.01	.02	.22	.01
Female sex of the child	.34	.14*	.17	.20	.08	.15	.22	.12	.13	.29	.16*	.13
Having a disability	.08	.03	.18	.06	.02	.16	.22	.12	.14	.16	.09	.13
Perceived competence				.15	.50***	.02				-.003	-.01	.01
Controlled regulation				-.01	-.07	.01				.03	.25**	.01
R^2	.07			.28			.06			.12		
adj R^2	.05			.25			.03			.09		
ΔR^2	.07			.20			.06			.06		
$F_{(df)}$	$3.73_{(4,177)}$			$11.51_{(6,175)}$			$2.85_{(4,177)}$			$4.03_{(6,175)}$		

Note. *p<0.05 **p<0.01 ***p<0.001

5. Discussions

5.1. Differences in mentalization

Significant differences have been found in parental mentalization between the two groups. As we expected, parents of atypically developing children used significantly fewer mental descriptors when characterizing their children, compared to parents of typically developing children. This finding is in line with the results of Ansari et al. (2020) who also found that parents had a tendency to predominantly share information regarding specific symptoms of disability when describing their children with developmental difficulties. Moreover, our result also corresponds with the recent findings of Nicholls et al. (2023) who proposed that difficulties in emotional and behavioral regulation of the child lead to a restricted ability of the parent to mentalize which may explain the difference between the two groups. Ghanbari et al. (2023) concluded that inappropriate and inconsistent reactions of the child to his environment may also result in a decreased level of parental mentalization, highlighting the relevance of our findings.

Interestingly, differences in parental mentalization have only been found when using the representational measure. Despite our expectations, no differences have been revealed regarding certainty about mental states and interest and curiosity in mental states. These results outline the lack of consistency in research findings regarding parental mentalization as reported by recent studies (Clarkei et al., 2020; Mattheß et al., 2023; Sprecher et al., 2023). Kirk & Sharma (2017) investigated mentalization of parents having both typically and atypically developing children, finding no significant differences. Interestingly, Ansari et al. (2020) replicated this research, obtaining inconsistent results: it was found that parents used significantly less mental descriptors when describing their child with disability compared to their descriptions about the typically developing sibling. Furthermore, Larkin et al. (2020) revealed no significant differences in mentalization, while still identified a tendency in parents of atypically developing children to construct representations related to the diagnosis.

Taken together, our results show differences in parental mentalization when a representational measure is used, but no difference can be found when mentalization is measured from the perspective of the parents, highlighting contradictions that have been outlined in previous studies and emphasizing the need of further research.

5.2. Predictors of self-reported parental mentalization

Confirming our hypothesis, basic psychological needs predicted parental mentalization. Parent's age, child's age, female sex of the child and perceived competence were identified as significant predictors of certainty about mental states. More precisely, findings suggest that the younger the parents are, the more certain they perceive themselves about understanding their children's mental states. This finding does not correspond with the result of Gagné et al. (2023) who revealed a positive association between parental age and mentalization. However, as suggested by some authors (Lee et al., 2022; Chen et al., 2023), mentalization may have a fluctuating tendency as parent-child interactions evolve, being actively influenced by the experiences of the parent. Therefore, at a younger age, parents may perceive themselves as being more certain about their children's mental states, their perceptions being influenced at this point by their expectations rather than experiences (Lindblom et al., 2022; Mattheß et al., 2023).

Further results show that certainty increases with the age of the child and parents also reported a higher level of certainty in the case of girls compared to boys. These findings are in line with the results of (Gagné et al., 2023). After controlling for demographic variables, perceived competence was found to be a significant predictor of certainty about mental states, indicating that a higher level of perceived competence predicts an increased level of certainty regarding internal states of the child. Our findings are supported by recent studies (Antwi, 2023; Desimpelaere et al., 2023; Gur et al., 2023) highlighting the importance of perceived competence with regards to parental mentalization. As pointed out byYoung et al. (2020), this association also emphasizes the vulnerability of parents of atypically developing children to experience difficulties in mentalization as a result of decreased level of perceived competence. Taken together, this predictive relationship between perceived competence and certainty about mental states may be considered as a potential explanation for the abovementioned difference in mentalization between the groups of parents of typically and atypically developing children.

Interest and curiosity in mental states was found to be predicted by the level of controlled regulation perceived by parents. Interestingly, a positive association was revealed between the two variables, suggesting that the more externally controlled parents feel themselves (i.e. the less autonomy they have), the more curious they become about their children's mental states. This finding does not correspond with previous results concerning mentalization (Ballespí et al., 2021; Desimpelaere et al., 2023). However, it aligns with the theoretical conceptualization of I (interest)-type and D (deprivation)-type curiosity (Litman, 2008). I-type curiosity leads to the pleasurable recognition of having the possibility to gain new information, while D-type curiosity results in the intension of avoiding uncertainty generated by the personal consideration of lacking relevant information (Litman, 2010). According to this approach, parents reporting a lower level of perceived autonomy, may show increased interest towards their children's mental states due to their concerns about missing knowledge that a parent should have gained. The tendency outlined in the current study can also be supported by previous results regarding the universality vs. different forms of autonomy across cultures (Helwig, 2006).

6. Conclusion

A prominent difference has been found in parental mentalization between the group of parents of typically and atypically developing children: parents of children with disabilities used significantly fewer mental descriptors and predominantly characterized their children in terms of diagnosis-related symptoms. Both perceived competence and controlled regulation were identified as significant predictors considering different levels of self-rated parental mentalization. A positive relationship was revealed between perceived competence and certainty about mental states. Controlled regulation was also positively associated with interest and curiosity in mental states. Taken together, these results suggest that perceived competence and controlled regulation may be considered as key determinants of self-reported parental mentalization. More studies should be conducted in order to further analyze this relationship.

One major strength of our study consists in examining mentalization in a sample of parents raising children with a broad range of disabilities. Addressing both parent-related and child-related factors of mentalization provided a distinctive nature to our study. Moreover, the current research included a relatively large sample size, which contributes to the generalization of our results. However, considerable limitations should also be mentioned. Low internal consistency was found regarding the Pre-Mentalizing Modes of Mental States subscale and the Autonomous

Regulation subscale of Self-Regulation Questionnaire therefore we decided not to use them for further analyses. An additional limitation can be identified concerning the heterogeneity of research findings in the case of self-reported measures of mentalization. Future studies should consider using alternative measures for assessing mentalization.

Declaration of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability statement

The data that support the findings are available in Figshare, at https://doi.org/10.6084/m9.figshare.29653682.v1

Ethics statement

The study is in line with research ethical standards, the participants provided their written informed consent to participate in this study.

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Performance and Organizational Behavior in Contemporary Educational Institutions: Theoretical Foundations and Applied Approaches

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Performance and Organizational Behavior in Contemporary Educational Institutions: Theoretical Foundations and Applied Approaches

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Abstract

The paper investigates performance and organizational behavior within contemporary educational institutions from both theoretical and applied perspectives. Building on classical conceptions of performance as process and outcome, it analyzes the factors that determine efficiency and effectiveness at individual and organizational levels: institutional culture, professional motivation, leadership, and communication. The quantitative research was conducted on a sample of 50 teachers working in pre-university education, using a 15-item Likert-scale questionnaire. The results indicate a predominantly positive perception of organizational culture, highlighting that intrinsic motivation, constructive feedback, and democratic leadership are essential predictors of educational performance. The findings emphasize the importance of creating an institutional climate based on cooperation, trust, and continuous professional development, as well as strengthening managerial competencies toward participative leadership. The study proposes an integrated analytical framework for educational performance, combining theoretical insight with practical applicability, and offers valuable guidance for managers, teachers, and researchers in the field of educational sciences.

Keywords:
performance, organizational behavior, educational management, organizational culture, efficiency

1. Introduction

In the context of contemporary social, economic, and technological transformations, educational performance has become an essential condition for the modernization of school systems. Educational institutions can no longer be viewed merely as spaces for knowledge transmission but as complex organizations in which human resources, motivation, culture, and leadership converge toward a shared goal: the formation of competent, autonomous, and adaptable generations.

Performance, as an expression of both efficiency and effectiveness, represents not only the achievement of objectives but also the process through which they are attained. Organizational behavior directly influences institutional results, reflecting how values, norms, and internal interactions shape teachers' professional activity.

This paper aims to analyze the interconnections among educational performance, organizational culture, and individual behavior within schools, complementing the theoretical framework with an applied study conducted in the educational environment.

2. Theoretical foundation

Popescu-Neveanu (1978) defines performance as "an action producing effects that exceed the common level, being superior or even record-breaking." In a broader sense, the term is associated with success, achievement, efficiency, and excellence.

Bourguignon (1995) identifies three major perspectives on performance:

1. Performance as action – a continuous process of improvement;
2. Performance as result – the measurement of achieved outcomes;
3. Performance as success – the expression of fulfillment and goal attainment.

In education, performance involves both the achievement of academic standards and the development of learners' motivation, creativity, and competencies. Lebas (1995) considers performance to be future-oriented, reflecting the organization's ability to adapt and learn from experience.

Thus, educational performance lies at the intersection between efficiency (the optimal ratio between resources and results) and effectiveness (the extent to which educational objectives are achieved).

Organizational culture is defined as a set of shared values, beliefs, symbols, and behaviors that guide the activity of an organization's members (Schein, 2010).

In educational contexts, it influences collaboration, perceptions of authority, openness to innovation, and conflict management.

A positive and participatory culture fosters motivation, engagement, and cohesion, while a rigid or overly formalized culture leads to stagnation and resistance to change. Institutional performance thus depends on the balance between stability and flexibility, and between continuity and innovation.

According to Pineau (2013), the paradigm of performance has enabled a closer relationship between organizational theories and educational theories, offering practical tools for institutional improvement and the professional growth of teachers.

Armstrong (2014) defines performance management as "a strategic and integrated process designed to deliver sustained organizational success by improving the performance of individuals and teams."

In education, performance management involves:

- setting clear and measurable objectives for teachers;
- conducting continuous evaluation of professional progress;
- ensuring motivation and recognition of achievement;
- supporting competence development through ongoing training.

Organizational behavior reflects how teachers relate to institutional objectives, colleagues, and leadership. Campbell (1990) asserts that performance is "an observable behavior" resulting from the interaction of competence, motivation, and contextual factors.

In high-performing schools, educational leaders adopt a participative leadership style based on trust and open communication, leading to greater engagement, innovation, and job satisfaction.

3. Research methodology

3.1. Research Objectives

The study aimed to identify teachers' perceptions of the factors that contribute to individual and organizational performance in educational institutions. The specific objectives were to:

1. Analyze teachers' perceptions of the influence of organizational culture on performance;

2. Examine the relationship between professional motivation and perceived performance;

3. Evaluate the impact of communication and leadership on the organizational climate.

The study employed a quantitative, descriptive-correlational design aimed at analyzing teachers' perceptions of the key determinants of individual and organizational performance within educational institutions. This methodological approach was chosen to obtain measurable and comparable data that would allow the identification of trends, correlations, and potential predictors of performance-related attitudes.

3.2. Participants

The research involved a sample of 50 teachers working in pre-university education, selected using simple random sampling to ensure representativeness across variables such as gender, years of professional experience, and teaching specialization. The sample included 38 female (76%) and 12 male (24%) teachers, with teaching experience ranging from 2 to over 25 years. Participation was voluntary and anonymous, with respondents informed about the academic purpose of the study and data confidentiality principles.

3.3. Instrument

Data collection was carried out using a structured questionnaire composed of 15 items rated on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). The instrument was developed based on existing literature on organizational performance and educational management (Armstrong, 2014; Schein, 2010; Neely, 2002). The questionnaire comprised three main dimensions:

1. Organizational Culture – assessing shared values, collaboration, and openness to change (4 items);

2. Professional Motivation – evaluating intrinsic and extrinsic motivational drivers and the perceived value of professional recognition (5 items);

3. Communication and Leadership – measuring perceptions of participative leadership, feedback mechanisms, and the quality of internal communication (6 items).

To ensure content validity, the instrument was reviewed by two university experts in educational management and psychology, who provided feedback on clarity, consistency, and relevance of items. Minor

linguistic adjustments were made to improve readability and conceptual precision.

3.4. Data Collection and Procedure

The data were collected over a two-week period through an online form distributed via institutional email. Respondents were instructed to answer honestly and to base their responses on their actual experience within their school. Completing the questionnaire took approximately 10–12 minutes.

3.5. Data Analysis

The data were analyzed using descriptive statistics (frequencies, means, and standard deviations) to identify general response trends, as well as correlational analysis (Pearson's r) to explore relationships between motivation, communication, and perceived performance. All data were processed using SPSS version 26, with a confidence interval of 95%. Reliability analysis indicated a Cronbach's Alpha coefficient of 0.87, confirming strong internal consistency of the instrument.

3.6. Ethical Considerations

The study adhered to the ethical standards of academic research. Participants were informed about the objectives of the research, the voluntary nature of participation, and the confidentiality of their responses. No identifying data were collected, and participation had no evaluative consequences.

4. Results

The quantitative data analysis revealed several significant findings that illustrate teachers' perceptions of performance and organizational behavior within educational institutions.

A large majority of respondents (82%) agreed that the organizational environment directly influences personal and collective performance, emphasizing the role of institutional climate, collaboration, and leadership style in shaping professional efficiency. Teachers highlighted that when communication channels are transparent and feedback is constructive, the level of engagement and satisfaction increases considerably.

Furthermore, 76% of teachers strongly agreed that recognition of individual merits and the provision of constructive feedback represent critical sources of motivation. Respondents noted that professional acknowledgment — whether formal (through evaluations or promotions) or informal (through appreciation and support) — fosters a sense of belonging and drives higher levels of effort and creativity.

Regarding leadership, 68% of respondents emphasized that a democratic and participative leadership style contributes to cohesion and team efficiency. The perception of leadership as inclusive and transparent was correlated with increased organizational commitment ($r = .63$, $p < 0.01$).

On the other hand, 54% of teachers reported that continuous professional development programs are underutilized within their schools, suggesting that institutional mechanisms for training and innovation are often formal but not strategically integrated into practice.

The overall mean score for perceived organizational performance was $M = 4.12$ ($SD = 0.56$), indicating a predominantly positive evaluation of institutional functioning. Subscale means were as follows:

- Organizational Culture: $M = 4.08$ ($SD = 0.49$)
- Professional Motivation: $M = 4.15$ ($SD = 0.52$)
- Communication and Leadership: $M = 4.13$ ($SD = 0.58$)

These results suggest a balanced perception of performance-related dimensions, with slightly higher emphasis on motivational and leadership aspects.

Correlation analysis confirmed significant relationships among the three main variables:

- Organizational culture and professional motivation: $r = 0.71$ ($p < 0.01$)
- Motivation and leadership: $r = 0.68$ ($p < 0.01$)
- Organizational culture and perceived performance: $r = 0.76$ ($p < 0.01$)

These coefficients indicate a strong positive association between teachers' motivational state and the perceived quality of institutional leadership and culture.

The results highlight that teachers perceive performance as a multifactorial construct, emerging from the interaction of internal (motivational) and external (organizational) factors. The high correlation between organizational culture and perceived performance ($r = 0.76$) demonstrates that a supportive, trust-based, and participative institutional environment strongly enhances teachers' engagement and output quality.

The data suggest that intrinsic motivation plays a more significant role than extrinsic rewards in

sustaining performance. Respondents associated intrinsic motivation with autonomy, recognition, and alignment between personal and institutional values — elements previously identified in the works of Armstrong (2014) and Neely (2002) as essential drivers of sustainable performance.

Teachers' preference for democratic leadership reflects a shift away from hierarchical management toward shared decision-making and empowerment. This perception aligns with Schein's (2010) theory of adaptive culture, according to which leadership that values participation and feedback creates conditions for innovation and psychological safety within organizations.

The moderate dissatisfaction regarding the utilization of training programs (reported by 54% of participants) suggests a gap between policy and practice — indicating that while institutional discourse emphasizes lifelong learning, the actual implementation of professional development remains inconsistent. This finding resonates with Pineau's (2013) assertion that performance-oriented institutions must translate their educational paradigms into actionable, measurable practices.

Overall, the findings illustrate that organizational climate and leadership practices are decisive in shaping performance behaviors. Schools where communication is transparent, recognition is consistent, and participation is encouraged tend to exhibit higher collective efficacy and professional satisfaction.

These results support a holistic understanding of educational performance, integrating human, organizational, and managerial dimensions. The data reaffirm that performance is not solely the outcome of individual competence, but rather the product of systemic harmony among institutional culture, leadership, and professional motivation.

5. Discussions

The findings of this research provide significant insights into the complex relationship between performance, motivation, and organizational behavior in educational settings. The results confirm that teachers' perceptions of performance are influenced by an integrated set of variables — organizational culture, leadership, communication, and professional motivation — which together shape both individual efficiency and institutional success.

The strong correlations identified among organizational culture, leadership, and performance (ranging from 0.68 to 0.76) are consistent with Schein's (2010) model of organizational culture, which emphasizes that shared values and behavioral norms form the foundation for collective performance. Schein argues that culture acts as both a stabilizing and adaptive force within institutions — a perspective supported by the current findings, where teachers associate high performance with collaboration, trust, and openness to change.

Similarly, the importance of intrinsic motivation observed in this study resonates with Armstrong's (2014) model of performance management, which defines sustainable success as the outcome of engagement, recognition, and alignment between individual and organizational goals. In schools where teachers perceive their contribution as valued, motivation becomes self-sustaining, leading to greater professional satisfaction and innovation.

The results also support Zlate's (2004) conceptualization of managerial psychology, according to which leadership should balance task orientation with socio-emotional support. Democratic leadership styles, as preferred by 68% of respondents, create environments where communication is not merely hierarchical but dialogic — allowing for knowledge exchange, emotional support, and shared responsibility.

From a managerial perspective, the findings highlight that the effectiveness of an educational institution depends on the coherence between strategy, leadership, and culture. Performance management should therefore be regarded not as a control mechanism but as a collaborative process that integrates clear goals, constructive feedback, and continuous learning.

Educational leaders should cultivate what Schein terms a "learning culture", characterized by transparency, empowerment, and reflection. In such environments, teachers feel safe to innovate, admit mistakes, and engage in self-improvement — all of which are precursors of authentic institutional performance.

Moreover, the fact that more than half of teachers consider professional development programs insufficiently utilized underlines the need for systematic investment in teacher training. Institutions should design coherent strategies that connect professional development activities with measurable performance outcomes, ensuring that learning translates into concrete pedagogical and organizational improvements.

At a systemic level, the study contributes to understanding how organizational dynamics influence educational quality. Performance should not be viewed exclusively through quantitative indicators (such as student achievement scores or institutional rankings) but through qualitative dimensions, including staff morale, collaboration, adaptability, and innovation capacity.

Neely (2002) suggests that organizations capable of measuring and managing performance holistically are better equipped to adapt to external pressures and internal transformations. In education, this means integrating data-driven evaluation with human-centered management practices.

Furthermore, the results confirm the growing need for participative governance in schools. When decision-making processes include teachers' input, the sense of ownership and accountability increases, leading to collective responsibility for performance outcomes. This participatory approach aligns with the principles of transformational leadership, where leaders inspire, mentor, and empower rather than control.

Based on the empirical evidence and theoretical synthesis, several actionable recommendations emerge:

1. Strengthen participative leadership: Encourage collaborative decision-making and shared responsibility among staff.

2. Institutionalize feedback culture: Implement structured systems of recognition, peer evaluation, and reflective dialogue.

3. Redefine professional development: Align training programs with actual institutional needs and follow up with measurable impact assessments.

4. Promote psychological safety: Foster a climate of trust where teachers can express ideas or challenges without fear of reprisal.

5. Integrate performance indicators: Combine qualitative and quantitative metrics (e.g., satisfaction, innovation, results) in assessing institutional success.

By adopting these strategies, educational institutions can evolve into adaptive, learning-oriented organizations capable of maintaining long-term excellence.

Although the study provides valuable insights, several limitations should be noted. The sample size, while adequate for descriptive analysis, limits the generalizability of results across all educational contexts. Future research could expand the sample and include comparative studies across different educational levels or regions.

Additionally, longitudinal approaches could explore how changes in leadership or institutional culture affect performance over time. Combining quantitative methods with qualitative interviews may also yield a deeper understanding of teachers' lived experiences within organizational settings.

In sum, the discussion underscores that educational performance emerges from the interdependence of motivation, leadership, and culture. Effective educational management is less about enforcing performance and more about creating the conditions in which performance naturally thrives — through trust, autonomy, and shared purpose.

These findings contribute to the growing body of evidence that educational institutions, much like other organizations, must continuously learn, adapt, and evolve to meet the demands of the 21st century.

6. Conclusions

This study set out to explore the dynamic interrelations between performance, organizational behavior, and leadership practices within contemporary educational institutions. Guided by the premise that performance is both a process and a result, the research sought to understand how teachers perceive and experience the conditions that foster individual and collective achievement.

The findings reveal that educational performance emerges as a multidimensional construct, integrating cognitive, motivational, relational, and managerial components. Teachers perceive that their ability to perform effectively depends not only on individual competencies but also on the institutional ecosystem — the quality of leadership, organizational culture, and communication patterns.

The results demonstrated consistently positive evaluations across all three major dimensions analyzed: organizational culture (M = 4.08), professional motivation (M = 4.15), and communication and leadership (M = 4.13). These values, together with the strong intercorrelations among them (ranging from .68 to .76), confirm that performance is embedded in the synergy between motivation, management, and culture.

Moreover, the data underscore the importance of democratic leadership and transparent

communication. Teachers expressed higher satisfaction and motivation in contexts where leaders practiced inclusion, feedback, and recognition rather than control and surveillance. This validates Schein's (2010) assertion that leadership is the primary mechanism through which culture is created, maintained, and transformed.

Another significant result concerns the partial dissatisfaction regarding professional development opportunities. Although most teachers value lifelong learning, they perceive that institutional training programs are often fragmented, poorly connected to actual needs, and rarely evaluated for impact. This gap between policy and practice represents a potential barrier to sustained performance.

From a theoretical perspective, this research extends classical models of organizational performance by incorporating a human-centered educational dimension. The findings substantiate Armstrong's (2014) argument that effective performance management is not a system of control, but a culture of dialogue and mutual accountability. In educational settings, such an approach means fostering environments where teachers are active partners in shaping institutional goals.

Neely's (2002) model of holistic performance measurement also resonates with the current findings. It suggests that successful organizations align performance indicators with strategic values. In education, this alignment translates into coherence between pedagogical vision, staff development, and institutional innovation. The study demonstrates that when teachers perceive alignment between institutional goals and their own professional identity, motivation and engagement increase substantially.

In line with Zlate's (2004) managerial psychology framework, the results reaffirm that emotional and relational factors play an equally important role as structural or procedural ones. A school's capacity to generate high performance depends on its ability to balance rational coordination with emotional cohesion — an equilibrium that defines organizational health.

Finally, Pineau's (2013) reflections on educational paradigms are reflected here as well: performance in education is a collective construction, not an individual accomplishment. The findings show that collaboration, trust, and shared meaning represent the "social capital" of performance.

The study provides several concrete implications for educational leaders, administrators, and policymakers.

1. Transforming leadership roles: Effective educational leaders must evolve from being administrators to becoming catalysts of motivation and innovation. Their role is to empower rather than to control, to communicate vision rather than to enforce compliance. Schools that practice shared leadership demonstrate higher adaptability and staff satisfaction.

2. Developing a feedback-oriented culture: Regular, constructive, and multidirectional feedback strengthens teachers' confidence and professional growth. When evaluation is perceived as supportive rather than punitive, performance improves sustainably.

3. Enhancing professional development: Training and lifelong learning must be aligned with institutional strategies and pedagogical realities. Professional development should not be isolated events but systemic processes, connected to teachers' specific needs and followed by reflective practice.

4. Fostering psychological safety: An open climate, free from fear of judgment, encourages teachers to take pedagogical risks and propose innovative ideas. According to the data, environments marked by trust and empathy significantly increase motivation and organizational commitment.

5. Integrating quantitative and qualitative evaluation: Educational performance should be measured using both numerical indicators (e.g., academic results, participation rates) and qualitative dimensions (e.g., collaboration, satisfaction, innovation). A mixed assessment model provides a fuller understanding of institutional health.

At a macro level, the study highlights that performance in education cannot be dissociated from broader social and cultural dynamics. Schools reflect the societies they belong to: democratic cultures tend to produce democratic schools. When communication, respect, and shared governance become institutional norms, educational performance follows naturally.

This reinforces the need for policy coherence between educational reform and institutional reality. Many reforms fail not because of their content but because they overlook the human and cultural dimensions of implementation. The current research thus calls for an approach that integrates organizational psychology, educational leadership,

and sociology of education — a truly interdisciplinary vision of performance.

Furthermore, the study's conclusions resonate with international frameworks on educational quality (OECD, UNESCO), which increasingly emphasize teacher well-being and professional autonomy as essential predictors of performance and innovation. By investing in teacher motivation and leadership capacity, educational systems can achieve progress that is both measurable and meaningful.

While the results offer valuable insights, certain limitations must be acknowledged. The relatively small sample size (N = 50) restricts the generalizability of findings. Future research should employ larger and more diverse samples, possibly including comparative analyses between rural and urban schools or between different educational levels (primary, secondary, vocational).

Another limitation concerns the self-reported nature of data. Teachers' perceptions, although informative, may be influenced by contextual factors such as institutional pressure or personal experience. Complementary qualitative approaches — such as in-depth interviews or focus groups — could enrich future studies by providing deeper insights into lived experiences of organizational culture and motivation.

Additionally, a longitudinal design could help assess how changes in leadership, policies, or institutional culture influence performance over time. Monitoring such dynamics would enable a better understanding of the sustainability of motivational and organizational changes.

Ultimately, this study confirms that educational performance is not a product of isolated excellence but of collective coherence. The effectiveness of a school depends on its capacity to transform individual potential into collective intelligence — a process rooted in dialogue, trust, and shared purpose.

A high-performing educational institution is one that continually learns from itself. It cultivates reflection as much as action, cooperation as much as competence, and empathy as much as efficiency. By aligning its managerial strategies with human values, the educational organization becomes not only productive but also humane — capable of inspiring transformation beyond its walls.

As we look to the future, performance in education must be understood as a moral and relational endeavor: a commitment to nurturing both excellence and equity, innovation and integrity. Institutions that internalize this ethos will not only achieve measurable success but also contribute meaningfully to the advancement of society as a whole.

Authors note:

Diana-Gabriela Corfu is a Ph.D. candidate at the Ion Creangă State Pedagogical University of Chișinău, specializing in Educational Sciences. Her doctoral research focuses on organizational performance and professional motivation within educational institutions, exploring how institutional culture and leadership practices influence teachers' behavior and engagement. Her academic interests include educational communication, digital media, and the integration of technology in learning environments. Her current work combines quantitative and qualitative approaches to develop strategies that promote performance, collaboration, and professional well-being in contemporary educational systems.

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Body, Mind and Curriculum: Philosophical Foundations for Health Education

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Body, Mind and Curriculum: Philosophical Foundations for Health Education

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Abstract

The article investigates the philosophical foundations of health education through the triad body–mind–curriculum and proposes an applied framework for the Romanian context. Drawing on local cultural resources (the ethic of measure, personalism, the prophylactic tradition) and international landmarks, we argue that health is not a fixed state but a process that interweaves biological, psychological, social and spiritual dimensions. Methodologically, the study is conceptual–analytical, with a case study of Romania, and integrates perspectives from the philosophy of education, bioethics and the salutogenic model. The conceptual results indicate four normative axes for curriculum design: the dignity of the person, community responsibility for the common good, practical wisdom, and prudence as avoidance of extremes and moralising. These axes lead to a transversal, experiential architecture.

Keywords:
curriculum, health education, philosophy, culture, Romanian context, curricular futures

1. The philosophy of Romanian cultural context

Culturally, Romanian society tends to treat health as a foundation of human life, often understood as living prudently, wisely and in harmony with one's environment (physical, geographical, social). Health reflects our way of being and of reasoning freely. A philosophy of health, as an existential attitude, defines the person from the perspective of holistic medicine, an integrative view of bodily, psychological and social well-being. In this frame, the philosophy of health sustains a positive, constructive disposition towards existence, inviting open discussion of the philosophical grounds of health (Alemdar, 2022).

A comprehensive conception of health is not a recent fashion: its beginnings can be found already in ancient medicine. At the same time, cultivating health in the school environment remains essential, as society has recently faced disruptive events such as the COVID-19 pandemic. It is no accident that we frequently speak of 'healthy eating', 'healthy lifestyle', 'healthy environment', 'healthy school'—recognising health as a primordial value whose absence or threat we perceive, paradoxically, most clearly in limit situations, for when we are healthy we tend not to maintain this fact.

Such ideas about health, common in Romanian society, also open a philosophical perspective on making health education an integral part of the Romanian curriculum. Many classical authors saw the ideal of human life in the harmony of body and mind. To live healthily also means to live wisely: for Aristotle, the meaning of human conduct culminates in eudaimonia—a state of fulfilment and harmonic measure. In this sense, health becomes the mirror of our condition: the experience of a generally satisfactory life, a good fit between body, soul and spirit, and the quality of our relations with the surrounding world. The 'authenticity' of health cannot be exhausted by diagnoses, tests or external evaluations; it is lived as a global feeling of fulfilled life. Romanians also tend to associate health with well-being stemming from a good relationship with the divine. Usually, illness—lack of health—is associated in Romanian thought with divine punishment for certain sins of one's own or of one's forebears.

Therefore, health is neither the direct product of scientific research nor merely the effect of therapeutic procedures or the absence of disease. It is a personal value, accessible through good communication with oneself and with others, through the wisdom of an integrated way of life. It is not a fixed state, but a goal towards which most Romanians continually strive—together with the search for meaning in one's own life.

2. Philosophical concepts of health in Romania

The basis of health and of meaningful living is the person's spontaneous, creative self-formation in the face of inherent risks. Perhaps for this very reason, an 'exact' definition of health has always remained

elusive, especially within the rather chaotic history of Romanian cultural formation. The territories that now comprise Romania were successively occupied by conquering peoples who imprinted their own philosophies of health: initially Roman rule Latinised the area, then Ottoman domination lasted for several centuries. Thus, the Romanian context is an island of Latinity in a sea of Balkan influences of an Oriental philosophical type. To view health as a value of life means to live prudently, rationally and with moderation—an idea of Mediterranean origin, well adapted to Romanian national philosophy. Health reflects an authentic way of being and thinking, and a philosophy of health—understood as a way of life—views the person through holistic medicine, integrating physical, psychological, social and Christian-Orthodox spiritual dimensions. This philosophy endorses a positive and constructive stance towards life and invites open dialogue on the foundations of medical ethics. A systemic conception of health is not a modern invention: its roots go back to ancient medicine (Alemdar, 2022).

Two lines of analysis overlap ideologically in approaching health: an empirical one, which translates the concept by generalising partial results and quantitative methods; and a philosophical, hermeneutic one, which starts from hypotheses of meaning and derives conclusions regarding understanding and action (Papastephanou, 2025).

Although one might believe that, at the current stage of Romanian civilisation, health has the same meaning for everyone everywhere, in fact values related to life and health differ across time and space. Culture, customs, traditions and, above all, concrete living conditions shape these meanings. Today we increasingly speak about health as a process: an active becoming influenced by the person, family, lifestyle, school and community. In this context, both the traditional healer and the Western physician (the West being regarded in Romania as a quality benchmark) can succeed insofar as they enjoy public trust. In many places, without costly technologies, comparable results are achieved; of course, the physical and psychological profiles of those who resort to such practices may differ from those of Romanians, yet their experience is worth learning from.

We can easily fall into the impression that health lies exclusively ‘in the hands of doctors’, given that medicine now saves lives that once would have been lost. It is said ironically, in the spirit of Aldous Huxley, that ‘the progress of medical research means no one is truly healthy any more’—an allusion to the proliferation of diagnosis. However, illness can appear as a call to awakening, an opportunity for spiritual maturation or, on the contrary, a destructive force. There are many Romanian tales and folk stories in which the hero achieves victory only after a hard period of illness (Rybar, 2010).

If science operates with the measurable, health is not reducible to exactness: it remains a dynamic process influenced by conduct and experience. Illness is not an isolated piece to be extracted through a single medical act; the human being must be understood as an interplay between the material and the spiritual.

A philosophical view of health can be applied to any fact, situation or problem: it means the readiness to investigate, reflect and pose uncomfortable questions, including about our own presuppositions. From this perspective, a ‘philosophy of health’ should encompass a view that respects the person in their wholeness—akin to holistic medicine—and, at the same time, a global understanding of health, sensitive to how communities influence each other in an interconnected system. The issue is not only the body, but the body–mind–society relation and the broader context of the social determinants of health (education, housing, work). In the spirit of the WHO’s classic definition (1948) and the Ottawa Charter (1986), health is not reducible to absence of disease, but involves well-being and the capacity of people to control and improve their own lives.

Philosophy proceeds through openness and dialogue: anything can be questioned. It is, of course, possible to debate the very ‘necessity’ of a Romanian philosophy of health. Some view it with suspicion because it resists easy measurement; others consider it indispensable precisely because it addresses the concrete questions of daily life (Thapaliya, 2022).

Belief in the continuous progress of knowledge has taken root in the Romanian mind. Calls come from all directions to reflect on life, on harmful behaviours towards people and the environment, and to change our conduct. The European Union also exerts pressure to raise quality of life in Romania. Nevertheless, consumer demands are increasing and extend into domains where they did not previously exist. The trend has reached medicine and pharmacy: aggressive promotion of ‘health solutions’ can prompt treatments without demonstrable need. Here, concepts such as overdiagnosis and disease mongering become relevant—when clinical thresholds or definitions are widened so that more people appear ‘ill’. Health

literacy (the ability to find, understand and use credible information) and numeracy (absolute vs relative risks) are essential for citizens and professionals alike, including for the country's future—the young people now in schooling.

Enthusiasm for science, combined with the force of advertising, can turn Romanian citizens and youth into receptacles of diagnoses and medicines. Integrity issues add to this: clinical studies funded by companies may suffer conflicts of interest; hence transparency, full reporting of results and independent replication are basic ethical principles. A philosophy of health asks, in this context, where we draw the line between science and humanity, between pragmatism and the inviolable principles of respect for the person. Finding the 'right measure'—in the Aristotelian sense—remains one of the most difficult tasks of practical life. Sometimes we must slow down, self-examine and reorder our choices to live in harmony with ourselves, with others and with nature; salutogenic models (Antonovsky) shift attention from disease to the resources that generate health (meaning, coherence, manageability).

Such a philosophy supports a constructive attitude towards life and health and seeks to prevent dispositions that disturb our equilibrium. It is useful to note that attitudes such as fear or trust influence health behaviours, adherence to treatments and even the perception of pain (placebo/nocebo effects) (Alemdar, 2022). Supportive relationships, a sense of control and personal meaning can moderate stress and help us make better choices; this does not mean denying medicine but integrating the psychosocial dimension into care.

Health education in Romania's education system requires that we understand different ways of life and compare them maturely with our own habits. Our life and health should reflect conscious choices: desire (motivation), deliberation (reason) and implementation (action) work together. In contemporary terms: clear goal-value, informed decisions and habit formation through small, consistent steps; sometimes 'nudges' in the environment can support healthy choices without coercion (Buchanan, 2006).

When illness appears, it is worth asking what maintains it and what we can do—together with professionals—to alleviate it. It is important to distinguish between conditions linked to lifestyle and congenital or genetic diseases. When causes remain unaddressed, suffering can become chronic, and the 'vicious circle' of multiple medications and adverse effects becomes tempting. The philosophical line does not claim that 'we cure ourselves alone', but that the person's active participation—well-informed, supported and realistic—is part of the care process. In parallel, a critical eye must be kept on the excessive commercialisation of health: medical ethics does not overlap with the logic of profit, and health systems require safeguards for equity and integrity.

The doctor–patient relationship is built on trust: the patient alone can evaluate their pain and condition subjectively; on this basis, the clinician investigates, correlates and tests hypotheses. Simplistic models that reduce illness to a single cause and a single solution miss the complexity of real life. A biopsychosocial approach and shared decision-making—in which patient and doctor weigh benefits, risks and personal values together—offer a more solid.

3. Philosophical pillars of Health Education in the Romanian school system

Finally, the philosophy of health is also an invitation to converse about the foundations of pre-university education. Although this area has developed visibly in Romania, collaboration among professionals from different disciplines is still in progress: communication, recognition of limits, transparency and mutual respect remain conditions of maturation. Step by step, we are learning to articulate a culture of pupil care that does not oppose the technical to the human, but places both in the service of a life lived with meaning and measure, giving rise to new generations of Romanian citizens (Black, 2010).

In this light, some illnesses seem to find their roots in a Romanian way of feeling and thinking: worry, hatred and fear—with their branches (anxiety, bitterness, greed, cruelty)—weigh upon the body down to the cellular level and undermine balance.

In the Romanian context, reflection on health and education has oscillated between an ethic of 'measure' and a pedagogy of 'forming the whole person'. Beyond strictly medical language, the local intellectual tradition has thematised health as a balance between body, soul and mind, and education as gradual shaping of good-life habits. Two lines have been particularly influential: a communitarian one, linked to the village and to social organisation; and a personalist one, focused on personal dignity and responsibility.

On the communitarian line, the monographic sociology of Dimitrie Gusti (Rostas, 2020) centred the

real life of communities, where health did not appear as an isolated problem but as a nexus of relations—nutrition, work, housing, customs. Health education in this register is not merely information transfer but lived culture: hygiene, solidarity, culinary habits, rhythms of work and rest. Educational interventions make sense when tied to the concrete needs of the community—hence the emphasis on fieldwork and cooperation among school, family and local authorities (Noica, 2022).

On the personalist line, Constantin Noica's reflection on the 'fulfilment of being' (Noica, 2022) and Dumitru Stăniloae's theology of person and communion can be read, non-reductively, as suggestions for a health education oriented towards interiorisation and responsibility. Health is not a list of prohibitions but an exercise of well-weighed freedom: temperance, discernment, self-care that does not turn against the other. In this sense, health education becomes training in prudence (phronesis): judging concrete situations, avoiding extremes and cultivating measure as a civic-personal virtue (Noica, 2022).

Another relevant Romanian tradition concerns public hygiene and prophylaxis, illustrated by the public health school associated with names such as Ion Cantacuzino or Iuliu Hațieganu (Rostas, 2020). Although belonging to medicine, their vision suggests a pedagogy of prevention: sport, movement, fresh air, simple diet, an orderly daily rhythm. *Mens sana in corpore sano* is not a slogan but a curricular principle: hours of movement, practical food education, time for sleep and recovery. In this logic, the school not only informs but shapes environments—yards, canteens, timetables—that encourage healthy behaviours.

Culturally, the idea of 'style' (in Lucian Blaga's sense) can be transposed into an ethic of lifestyle: health as a luminous way of inhabiting one's own existence, without reducing the person to biomedical parameters. This sensibility invites education to avoid technocratism: not everything measurable is relevant, and what matters often calls for tact, dialogue and accompaniment. In school, this means embodied learning: cooking together, cultivating school gardens, hiking, reflecting on emotions and relationships (Noica, 2022).

After 1990, democratisation brought with it the language of citizenship: health literacy, the right to information, participation in decisions regarding one's body and environment. Here, a Romanian philosophy of health education can anchor itself in four normative coordinates: (1) the dignity of the person—no intervention without genuine informed consent; (2) community responsibility—public health is built in common (vaccination, environmental protection, solidarity with the vulnerable); (3) practical wisdom—simple rules, internalised, adapted to context; (4) measure—resistance to consumerist excesses or anxious 'bio' perfectionism.

In practical terms, the curriculum could operationalise these ideas through local projects (participatory diagnosis of community health needs), cooking and food-budget workshops, hiking and sports clubs, guided reflection on sleep and screens, portfolios of 'healthy practice' assessed formatively. Evaluation would not hunt errors but track progress: from information to habit, from habit to character (Black, 2010).

In sum, a 'Romanian philosophy' of health education may be summarised thus: health as lived measure, in which the person forms themselves in and for the community; an education that unites medical prevention with ethical formation, cultivating a lifestyle in which freedom is exercised with care and discernment (Noica, 2022).

4. Conclusions

Now, Romania's education system does not benefit from distinct subjects preparing pupils to understand health-education concepts. Yes, in primary, lower-secondary and upper-secondary education there are subjects that include topics on human health—Biology, Chemistry, Personal Development, etc.—but there is no separate subject, nor even specific modules, dedicated to this form of education. One route through which health may be studied in the Romanian system is the school-decided curriculum: courses designed individually by teachers for one school year. The problem is that not many teachers use this option, for various reasons.

It is beyond doubt that the Romanian context needs a subject such as health education. This form of education has a philosophical foundation in which health is not a medical state but a becoming of the body, mind and citizens' relations with the environment. In this key, the curriculum's stake is not merely to transfer biomedical information, but to form practical judgement, habits and character: pupils must be helped to understand, to choose and to live healthily, not merely to record information without real applicability.

The curricular consequence is clear: health education must be transversal and experiential.

Biology explains mechanisms; Physical Education cultivates the joy of movement; Romanian language and literature and the arts create spaces for narratives of illness and healing; Civic Education develops responsibility for the common good; Religion or counselling orient the search for meaning. These are complemented by concrete school practices: educational gardens and canteens, cooking workshops, healthy-nutrition clubs, and other community projects. Evaluation here should be predominantly formative and track progress from knowledgw to habit and from habit to virtue.

Experts in school community health also warn of risks: the medicalisation of school life, moralising behaviours and ignoring inequalities. To avoid these, the framework must be anchored in children's rights and social justice, favouring flexible guidance and contextualised micro-decisions rather than uniform recipes. Salutogenic models (focused on meaning, coherence, manageability) can serve as a compass: the central question is not only 'what disease do we prevent?' but 'what health resources are we building here and now?'.

The core conclusion is that 'body, mind and curriculum' are not parallel planes but faces of the same human formation. A school that offers experience, reflection and caring relationships produces citizens capable of balancing scientific progress with humanity, personal freedom with responsibility towards the community. For Romania, health education is therefore a cultural and civic-ethical project, not merely a chapter in a textbook.

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Review Article

Lost in Complexity? Readability and Emotional Shifts in Romanian Literature Textbooks

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Abstract

Educational materials are indispensable for literacy development, cognitive engagement, and knowledge acquisition in education, especially at primary and secondary levels. While readability research covers many contexts (designing textbooks for different domains), this field is particularly underexplored in Romania. Studies on linguistic overload in Romanian textbooks suggest that modern materials frequently exceed students' cognitive capacities, and reveal a correlation between increased linguistic complexity and declining student performance. The transition from a single-textbook system to a multi-textbook model in post-communist Romania offers more diverse resources, but increased lexical/syntactic complexity, potentially obstructing student engagement. We propose a comparative-analysis framework for evaluating literature textbooks, using corpus-based approaches. We compare Romanian textbooks used in high schools from two periods: ROTEX-OLD (pre-1989, communist state-approved textbooks), and ROTEX-NEW (2014-2024, diversified textbooks currently in use). Findings indicate an increase in linguistic complexity (i.e. low readability) in contemporary textbooks. Corpus analyses reveal that modern textbooks often exceed grade-appropriate readability levels, increasing cognitive strain. Sentiment analysis highlights a shift in emotional tone, with ROTEX-OLD textbooks characterized by patriotic and propagandistic themes, while ROTEX-NEW materials incorporate a more pessimistic perspective. This shift is correlated with linguistic features. The study advocates for linguistics-supported textbook readability assessments to balance linguistic complexity and pedagogical accessibility.

Keywords:
textbook readability assessment, linguistic complexity, Romanian literature textbooks, sentiment analysis in literature textbooks, LEMI readability formula

1. Introduction

In secondary education, educational materials play an important role in literacy development, cognitive engagement, and knowledge learning. Students' ability to comprehend and thoughtfully interact with such materials directly impacts their academic performance and long-term intellectual development. Beyond the classroom, these skills are essential for civic formation, as many of these students, in their final high school years or immediately thereafter, will be called to participate in elections for the first time. In societies where democratic institutions are fragile and public discourse is often marked by disinformation and propaganda, cultivating critical thinking empowers youngsters to evaluate sources, resist manipulation, and make informed decisions. At the same time, the emotional tones embedded in educational texts – whether optimistic, nationalistic, or pessimistic – shape students' psychological responses and worldview. Exposure to excessively sombre or negatively charged narratives can reinforce feelings of disillusionment or passivity, while balanced and critically framed materials can foster resilience, empathy, and active democratic engagement. Thus, educational practices that foster analytical literacy extend their impact beyond academic achievement, contributing to the resilience of democratic culture itself, by influencing even how citizens interpret reality as a form of discourse.

In this process, readability plays a strategic role: when texts are accessible and well-structured, students can engage with complex ideas critically, identify bias, and discern implicit messages. By contrast, texts that exceed students' cognitive capacities – due to excessive lexical density, syntactic complexity, or opaque discourse structures – can hinder comprehension and limit critical thinking development. Readability has been extensively studied in various educational contexts, including content textbooks (Hill & Erwin, 1984), mathematics course books (Çetinkaya et al., 2018), and foreign language literature textbooks (Calafato & Gudim, 2022). Early research (Aukerman, 1965; Dale & Chall, 1949) laid the foundation for readability analysis, emphasizing its impact on comprehension and learning outcomes. More recent studies (Hakim et al.,

2021; Owu-Ewie, 2014) highlight the ongoing challenges in aligning textbook readability with students' cognitive capacities, particularly in high school settings.

However, in Romania, research on the readability of high school literature textbooks remains significantly underexplored, with limited studies addressing its impact on student comprehension and academic performance. Research on linguistic overload in Romanian school textbooks (Chitez, 2024) suggests that modern materials frequently exceed students' cognitive capacities, reducing comprehension and motivation. A recent study the 8th-grade National Assessment (Chindriș, 2024) reveals a correlation between increased linguistic complexity and declining student performance. The transition from a single-textbook system to a multi-textbook model in post-communist Romania has expanded available materials but increased lexical density and syntactic complexity, potentially hindering student engagement (Chitez & Rogobete, 2024). Recent advancements in readability assessment, such as the LEMI Readability Platform (Chitez et al., 2024), provide new insights for evaluating didactic materials.

2. Method

2.1. Corpora and educational materials

This study proposes a multidimensional comparative-analysis framework for evaluating literature textbooks, using corpus-based approaches. We compiled two distinct corpora of Romanian high school literature textbooks to enable a comparative analysis of linguistic and discursive evolution: ROTEX-OLD (pre-1989), which includes state-approved textbooks from the communist era, and ROTEX-NEW (2000-2024), which encompasses the diversified textbooks currently in use.

The ROTEX-OLD corpus comprises four Romanian literature textbooks for high school, one for each grade level from 9th to 12th (approximately 400 000 words). To ensure consistency, we selected versions published in the 1970s and 1980s. These versions represent the standardized, state-approved materials released by the state publishing house, Didactic and Pedagogical Publishing House (Editura Didactică și Pedagogică). The ROTEX-NEW corpus comprises 20 high school literature textbooks covering grades nine through 12, published between 2004 and 2023. For each textbook, we recorded the grade level, publishing house, and year of publication (see Table 1). Unlike ROTEX-OLD, which reflects the uniformity of a state-controlled canon, ROTEX-NEW illustrates the pluralism of the post-1989 educational landscape. The corpus includes materials from multiple publishers (approximately 2 million words), such as Art, Humanitas, Corint, Sigma, Niculescu, and All, and sometimes includes several competing editions for the same grade level. For example, 11th grade textbooks are represented by at least five different publishers. Even within a single publishing house, such as Corint, multiple versions coexist. For instance, there are three distinct textbooks for 11th grade and two for 12th grade, both published in 2014. The diversity of ROTEX-NEW is the result not only of market and ideological liberalization, but also of institutional and academic interests in publishing. The main editor of a textbook is usually a renowned university professor affiliated with a prominent Faculty of Letters. This lends authority to the volume. This practice reflects an attempt to legitimize textbooks as scholarly products. By contrast, the authors of communist-era textbooks (ROTEX-OLD) were primarily educational science specialists and secondary philologists or literary scholars, often appointed or approved by the Ministry of Education. Their role was less to provide literary and theoretical perspectives and more to ensure ideological alignment.

Table 1

Textbooks used for the study

No.	Corpus	Grade	Publishing House	Year of publication
1	ROTEX-OLD	9	Editura Didactică și Pedagogică	1988
2	ROTEX-OLD	10	Editura Didactică și Pedagogică	1981
3	ROTEX-OLD	11	Editura Didactică și Pedagogică	1983
4	ROTEX-OLD	12	Editura Didactică și Pedagogică	1977
1	ROTEX-NEW	9	Art	2017
2	ROTEX-NEW	9	Art Klett	2022
3	ROTEX-NEW	9	Humanitas	2008
4	ROTEX-NEW	10	Art	2010
5	ROTEX-NEW	10	Art Klett	2023
6	ROTEX-NEW	10	Corint	2008
7	ROTEX-NEW	10	Humanitas	2006
8	ROTEX-NEW	11	All	2006
9	ROTEX-NEW	11	Art	2018

10	ROTEX-NEW	11a	Corint	2014
11	ROTEX-NEW	11b	Corint	2014
12	ROTEX-NEW	11c	Corint	2004
13	ROTEX-NEW	11	Humanitas	2006
14	ROTEX-NEW	11	Sigma	2006
15	ROTEX-NEW	12	Art	2009
16	ROTEX-NEW	12a	Corint	2014
17	ROTEX-NEW	12b	Corint	2014
18	ROTEX-NEW	12	Humanitas	2007
19	ROTEX-NEW	12	Niculescu	2007
20	ROTEX-NEW	12	Sigma	2007

This difference highlights a first significant shift: while the post-1989 ROTEX-NEW corpus reflects a plurality of literary canons curated by established university professors, the ROTEX-OLD materials demonstrate the state's monopolization of cultural transmission through pedagogical and ideological expertise.

A literary canon or multiple literary canons?

Before analysing selected textbook excerpts and their emotional tone, it is important to situate our discussion within the Romanian literary canon as represented in school textbooks. In its narrow sense, the didactic (literary) canon may be understood as a fixed list of representative writers associated with specific cultural codes, historical epochs, and aesthetic models – critically validated and "resistant in time" – thus contributing to the officialization of a uniform corpus grounded in the aesthetic evaluation of literature (Oprescu, 2011). Such a canon, as Simionescu (2022) points out, is marked by excessive stability, artificial simplification, hierarchical structuring, accessibility, conservatism, and claims to value and representativity. At the same time, it incorporates the "values, questions, intentionalities, and narratives" through which human nature is defined (Borza, 2015; Nemoianu, 1991). In a broader sense, however, the canon remains a contested and dynamic construct, a "travelling concept" (Borza, 2015), constantly (re)negotiated within cultural and pedagogical debates. This view resonates with Nemoianu's (1990) assertion that literary value is not intrinsic but rather positional and relative, shaped by socio-psycho-historical functions responding to the needs of specific communities in given contexts. The canon shapes not only what students read but also how they are trained to interpret literature as a reflection of culture, ideology, and identity. Under communism, the canon was restrictive and prescriptive, favouring certain authors aligned with the regime while marginalizing others. Several authors were considered classics because they expressed national identity and narratives, such as Mihai Eminescu and Ion Creangă. Sadoveanu became ubiquitous, transformed into the emblematic prose writer of the regime. Meanwhile, Marin Preda, Zaharia Stancu, Titus Popovici, and Fănuș Neagu partly solidified the socialist realist dimension of the canon. Alongside these authors, poets such as Eugen Jebeleanu, Mihai Beniuc, Miron Radu Paraschivescu, and, later, Nichita Stănescu and Marin Sorescu were selectively incorporated. This reflects both ideological pressures and a degree of openness to modernist experimentation. At the same time, the canon extended backward into folklore and early modern literature. It drew on authors such as Ion Neculce, Ion Budai-Deleanu, Vasile Alecsandri, and Petre Ispirescu. Meanwhile, Alexandru Vlahuță and Șt. O. Iosif provided patriotic and moralistic tones that resonated with the ideological imperatives of the time. This selective inclusivity illustrates how the canon functioned as both an educational and political tool, shaping students' exposure to literature through a tightly controlled framework.

Although one might expect that the post-1989 educational system in Romania would bring about a radical shift in both curriculum and reading lists, the changes have in fact been more ideological than structural. The current curriculum, which has been in place for the past three decades, still operates with a relatively fixed list of canonical authors (17 authors: Mihai Eminescu, Ion Creangă, I. L. Caragiale, Ioan Slavici, G. Bacovia, Lucian Blaga, Tudor Arghezi, Ion Barbu, Mihail Sadoveanu, Liviu Rebreanu, Camil Petrescu, G. Călinescu, Titu Maiorescu, Eugen Lovinescu, Marin Preda, Nichita Stănescu, Marin Sorescu) and a set of mandatory literary species and textual forms. Teachers are formally given the freedom to choose which text by a canonical author they include in their classes, yet they remain bound to cover particular literary species (epic, lyric, dramatic) and formal categories. In practice, this leads to a lack of diversification: most high school students will end up studying no more than twenty texts across the four years of secondary education, with an overwhelming emphasis placed on preparation for the *bacalaureat* examination.

For university-level teaching, this curricular rigidity produces an additional difficulty: many canonical authors are already so overexposed in high school that they risk becoming mere clichés. University professors are thus faced with a double task: on the one hand, to recontextualize canonical figures by showing that their œuvre extends beyond the handful of texts recycled in pre-university teaching; on the other hand, to draw attention to marginalized or non-canonical authors who, while excluded from the didactic canon, are nevertheless of high cultural or textual value.

To sum up, before 1989, the Romanian curriculum was built around a set of authors provided their works could be interpreted in line with the official discourse (whether real valuable or names associated with socialist realism who were elevated to the rank of national figures). After 1989, the ideological layer was stripped away. Socialist-realist writers disappeared overnight from the curriculum, and the new system sought to distance itself from the prescriptive, propagandistic model of the communist school. Another shift in these educational materials is represented by the framework: communist textbooks carefully framed the work within a national-historical narrative and an ideological grid. Context came first, interpretation followed. After 1989, this pattern shifted. The new textbooks aimed to normalize literary study in line with Western academic trends. Instead of ideological introductions, they privileged theoretical – aka textual categories and typologies. For example, *Moara cu noroc* / *The Lucky Mill* by Ioan Slavici was no longer framed solely as a story about social conflict under emergent capitalism, but as a paradigmatic realist and psychological novella. *Luceafărul* by Eminescu was read less as a "national myth" and more as an example of Romanticism, mythopoesis, and philosophical allegory. Under communism, literature was treated as a tool of collective identity and ideological formation; after 1989, literature became primarily an object of technical analysis within the framework of literary theory.

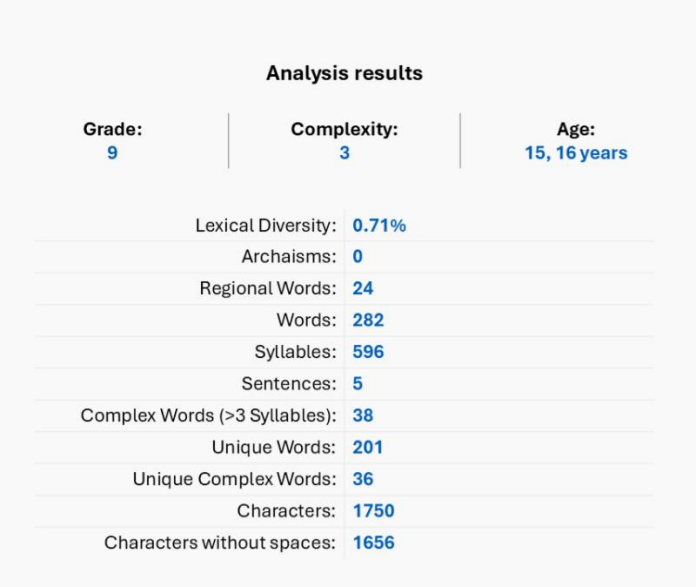
Yet this theoretical emphasis raises an important question: how accessible are the texts we ask students to read and analyse? Readability becomes an important issue here, since the gap between canonical authority and students' actual capacity to engage with the text often shapes their reception of literature.

2.2. Readability and LEMI platform

Readability has been studied for more than 100 years. It refers to how easily a reader can understand a written text. Several factors influence readability, including vocabulary complexity, sentence length, syntactic structure, and overall cohesion. In educational and linguistic research, measuring readability helps determine if a text is suitable for its intended audience, supports learning objectives, and meets accessibility standards. However, most traditional readability formulas, such as the Flesch Reading Ease or Gunning Fog Index, were developed for English and rely on language-specific features, such as syllable count per word and sentence length. However, applying these formulas directly to Romanian texts can produce misleading results because Romanian has different morphological and syntactic characteristics than English. To address this issue, Chitez et al. (2024) developed the LEMI platform and formula. It is the only "app that integrates a research-based readability formula for the Romanian language" (Chitez et al., 2024). The platform allows authenticated users to analyse the complexity of their uploaded texts. It indicates the text's group, age level, and complexity level (easy: 1, medium: 2, hard: 3), as well as lexical diversity, number of archaisms and regionalisms, number of syllables and words, and number of complex sentences. Figure 1 shows an example of output from the LEMI platform (www.lemi.ro) for an excerpt from *La Tazlău* by Calistrat Hogaș (included in ROTEX-OLD):

Figure 1

Example Output from LEMI Platform: Readability Analysis



For our analysis, we selected texts from the ROTEX-OLD and ROTEX-NEW textbooks, processing them using the LEMI platform to assess their readability according to Romanian-specific metrics. In addition to readability analysis, we performed a sentiment analysis using VADER (Hutto

& Gilbert, 2014) and Google Colab to evaluate the emotional tone of the texts. We also used Sketch Engine (Kilgarriff et al., 2004) to perform a lexical analysis of the two corpora.

3. Results

3.1. Lexical and Collocational Findings Using Sketch Engine

Taking a closer look at the frequency data generated with Sketch Engine highlights several differences between the ROTEX-OLD and ROTEX-NEW corpora. The vocabulary in earlier textbooks reflects the ideological orientation of the time. The prominence of terms such as *human, world, life, country, people, land* shows how educational materials were used to shape a vision of the "new socialist man", embedded in a collective national narrative. According to the logic of socialist realism, educational and literary discourse was responsible for representing the historical destiny of "the people" as a totalizing entity (see Table 2).

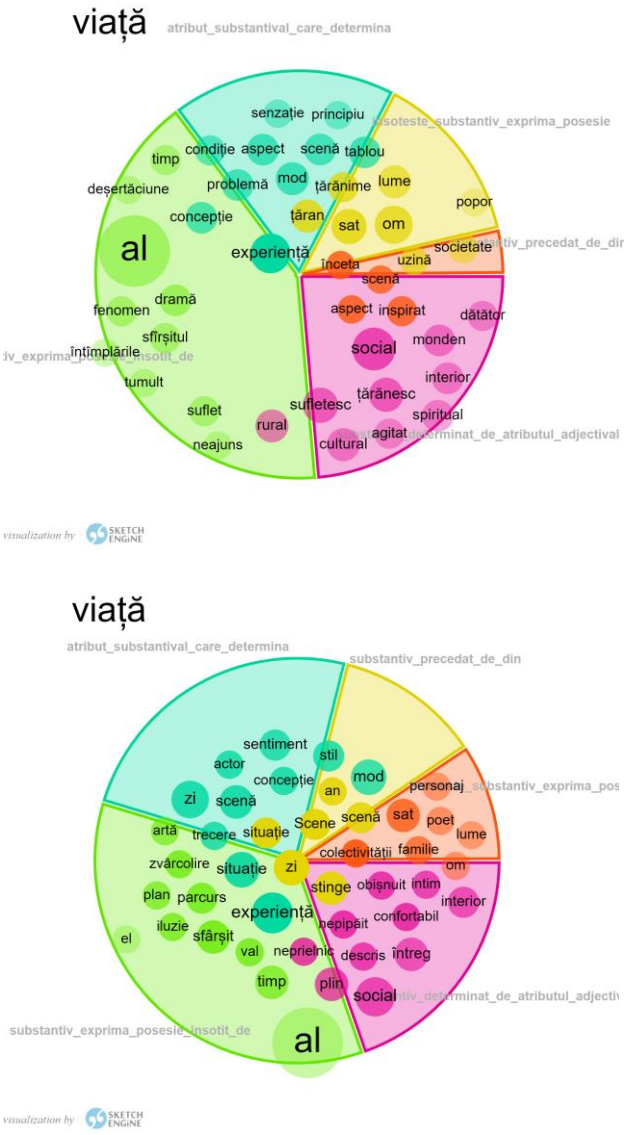
Table 2

Lexical frequencies

Word	Frequency per million – ROTEX-OLD	Frequency per million – ROTEX-NEW
Lume/World	1,179.59	992.50
Viață/Life	1,347.23	164.38
Țară/Country	743.30	50.63
Popor/People	502.94	255.58
Om/Human	1,951.16	1,101.05
Pace/Peace	107.05	46.12
Națiune/Nation	60.6	3.12
Pământ/Land	230.26	162.3
Partid/Party	44.44	56.18
Socialism	18.18	3.12
Moarte/Death	506.98	297.54
Crimă/Crime	18.18	25.32
Rău/Evil	84.83	54.79
Pozitiv/Positive	34.34	35.37
Negativ/Negative	44.44	64.5

Figure 2

Word sketch for "life" (OLD vs NEW)



By contrast, the ROTEX-NEW corpus tells a slightly different story. The texts shift toward a more individualized perspective, since they display a marked decline in the frequency of such collectivist terms. Here, texts are not framed by a politically charged worldview, but instead are analysed from formal and theoretical perspectives with an emphasis on narrative structure, stylistic features, and literary techniques. A word sketch of "life" (see Figure 2) indicates that literary texts promoted during communism tended to emphasize collective experiences, focusing on peasants, everyday fabrics of life, social dramas, the inevitability of death, and general hardships. Modern texts adopt a more analytical approach, exploring themes such as inner restlessness, illusions, and personal adversity. These works shift attention from collective identities to individual characters, examining their psychological

depth, personal dilemmas, and nuanced responses to social pressures, while still occasionally engaging with broader societal concerns. This focus allows students to identify more directly with the characters, making the reading experience more striking and engaging. However, the often pessimistic tone of these works, highlighting misfortune and existential struggle, can also have a negative emotional influence on students, potentially affecting their perception of human agency and the possibilities for positive outcomes.

3.2. Readability Assessment of ROTEX

Findings indicate a marked increase in linguistic complexity (i.e. low readability) in contemporary textbooks. While ROTEX-OLD materials featured structured instruction with controlled linguistic input, modern textbooks integrate a broader range of texts and multimodal strategies but do not necessarily enhance accessibility. Corpus analyses reveal that modern textbooks often surpass grade-appropriate readability levels, increasing cognitive strain (see Table 3).

Table 3

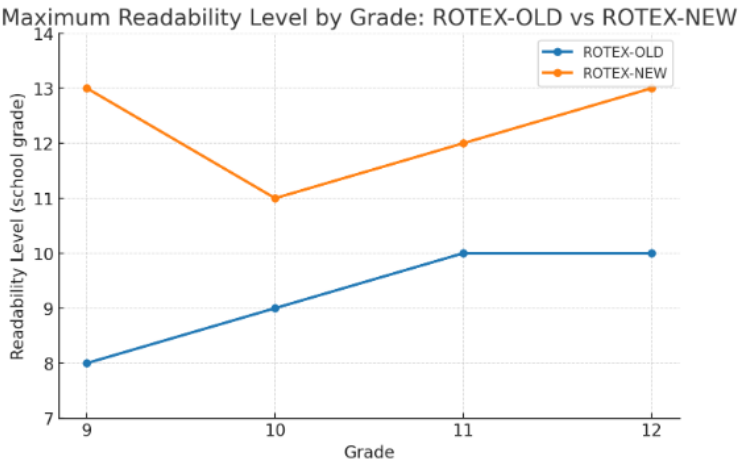
Readability levels

Grade	Maximum level in ROTEX-OLD	Maximum level in ROTEX-NEW
9	8th grade, medium level	>12th grade, hard level
10	9th grade, hard level	11th grade, medium level
11	10th grade, easy level	12th grade, medium level
12	10th grade, hard level	>12th grade, hard level

The data show a clear increase in linguistic complexity in contemporary textbooks (ROTEX-NEW) compared to the older ROTEX-OLD materials. The readability analysis demonstrates that modern textbooks are often more challenging than the students' expected level. ROTEX+OLD are close to expectations and students' level, while ROTEX-NEW are above students' immediate reading proficiency – for instance, for the 9th grade, there is a significant gap between students' reading skills and text difficulty. Modern textbooks prioritize also wider range of texts and multimodal strategies (different types of articles and reviews, letters, administrative texts etc. – so several nonfictional texts which were not often available in earlier textbooks), yet this has not improved accessibility. Instead, readability analyses suggest that many contemporary materials impose excessive cognitive demands, possibly affecting comprehension and learning efficiency. ROTEX-OLD levels (see blue line in Figure 2) stay close to or slightly above the students' grade, showing manageable text complexity. ROTEX-NEW levels (orange line in Figure 2) often exceed the expected grade level, especially in grades 9 and 12, highlighting the mismatch between text difficulty and students' reading abilities. The chart from Figure 3 clearly shows the trend toward higher cognitive demand in modern textbooks.

Figure 3

Visual representation of the gap in readability levels from ROTEX-OLD to ROTEX-NEW



3.3 Emotional Profiling of Texts through Sentiment Metrics

When analysing the educational materials, it's important to note that only a few author names appear in both the older (communist-era) texts and the modern ones. Due to this overlap, it is more meaningful to focus on measuring texts that differentiate the two corpora (ROTEX-OLD and ROTEX-NEW). A quantitative analysis of tone in Romanian textbooks reveals distinctions using a VADER-style sentiment breakdown. If in ROTEX-OLD we can identify an average stating the following scores: 'neg': 0.003, 'neu': 0.992, 'pos': 0.005, ROTEX-NEW shows slightly divergent scores: 'neg': 0.55, 'neu': 0.42, 'pos': 0.03. Needless to say, applying automated models to evaluate stylistic features, rhetorical devices, or figurative language in literary texts is considerably more challenging than performing sentiment analysis on product reviews (Briciu et al., 2024). Literary stylistics involves subtle, context-dependent elements such as irony, metaphor, or narrative tone, which are difficult for current NLP models to detect reliably. Consequently, quantitative assessments of style often require aggregation across multiple texts or hybrid approaches combining automated tools with expert human interpretation.

The emotional states expressed in texts vary from neutral to uplifting tones or compassion for certain society classes in ROTEX-OLD, to pessimistic tones related to critical reflections and fatalism in ROTEX-NEW. For instance, a quoted text from one of Ceaușescu's speeches emphasizes unity, heroic labor, and societal progress, presenting an idealized vision of life under the regime: „Let us unite, all peoples,/ In struggle, both small and great,/ To live freely under the sun,/ Without nuclear arms at all!// Let us all shout once again,/ May those who seek war perish,/ Let there be flowers on the fields,/ And a world of human kindness!// Let the weeds in the fields be gone,/ May hatred vanish from the world,/ All those with a good heart - / East and West - hand in hand" ('neg': 0.05, 'neu': 0.55, 'pos': 0.40). On the other hand, texts that are common to both OLD and NEW textbooks frequently include narratives that depict crime, violence, and social conflict. Examples include *The Hatchet* (*Baltagul*), *Ion*, *The Last Night of Love, the First Night of War*, and *The Lucky Mill*. These works do not shy away from harsh realities: crimes, murders, and personal vendettas are central to the plot and often drive character motivation. In *Ion*, for instance, the narrative includes not only murder but also sexual violence, highlighting the vulnerability of women within patriarchal structures (see Parvulescu & Boatcă, 2022). Racism and ethnic prejudice appear in *The Lucky Mill* and *Ion*, reflecting social hierarchies and tensions in (mostly) rural communities.

4. Discussion: Shifts in Romanian Literature Textbooks

Our study reveals that there are three major shifts from earlier (ROTEX-OLD) to contemporary (ROTEX-NEW) textbooks. First of all, there is a lexical shift: In the ROTEX-OLD materials, the lexical field is dominated by collectivist notions such as *people*, *life*, *country, world*. Vocabulary emphasizes the socialist „Weltanschauung", emphasizes community, social unity, reflecting the ideological and propagandistic aims of the period. Contemporary textbooks broaden the lexical range, incorporating terms related to individual experience, psychological states, and abstract concepts – this lexical complexity brings also therefore an emotional complexity, but also a shift in readability. Modern materials contain various text boxes (dictionaries, explanations etc.) which increase cognitive demand by requiring students to process layered meanings. This complexity presents both a challenge and an opportunity. It enriches students' analytical skills, but it can create accessibility issues if not addressed appropriately. Sentiment analysis reveals a final shift in emotional tone. There is a marked change in the affective quality of the texts. ROTEX-OLD materials typically convey a positive, uplifting, or propagandistic tone, emphasizing social cohesion, ideological optimism, and collective achievement. Contemporary textbooks, by contrast, often explore darker or more ambivalent themes, including moral conflict, social injustice, and the fragility of human life. This tone may reflect pessimism, existential reflection, or critical engagement with social realities, offering students opportunities to reflect on ethical dilemmas, human vulnerability, and societal change.

Romanian literature, particularly from the late 19th century through the interwar period, often portrays violence as an integral part of social life, whether through physical confrontations, exploitation, or systemic injustice. These texts explore the psychological and moral consequences of violent acts on individuals and communities, combining social critique with narrative tension. Incorporating such material into textbooks exposes students to complex ethical dilemmas, the darker sides of human behaviour, and the historical realities that shaped Romanian society (engaging with literature in these textbooks can feel remarkably akin to tuning in to the 5 o'clock evening news).

The depictions of violence, crime, and social injustice in Romanian literature raise important questions about how society chooses to educate young people. Including such narratives in textbooks encourages critical thinking and moral reflection by exposing students to the complexity of human behaviour and the consequences of unethical actions. At the same time, educators must balance this exposure with guidance, discussion, and contextualization, so that students do not become desensitized or overwhelmed by brutality.

Ultimately, the question becomes: What kind of citizens do we want literature to help cultivate? Do we aim to nurture empathy, ethical awareness, and social responsibility by confronting the darker aspects of life, or do we prioritize protective, idealized narratives that emphasize unity, heroism, and social harmony? The presence of violence in these texts underscores the potential of literature not merely to entertain, but to shape informed, reflective, and morally conscious members of society, who can navigate ethical dilemmas and understand the consequences of their actions within historical and social contexts. At the same time, it is equally important to provide students

with literature that models positive, prosocial behaviours and constructive responses to conflict, so that they can develop nonviolent strategies for coping with challenges, fostering empathy, and engaging responsibly with others.

Further research could build on this analysis using advanced computational approaches, such as text classification as in Gavrilă et al. (2021), or other methods of topic modelling and corpus-based analysis. Such methods would allow a more systematic exploration of thematic, stylistic, and lexical patterns across textbooks, offering deeper insight into how educational materials encode social, cultural, and ideological values.

5. Conclusions

In conclusion, comparing ROTEX-OLD and contemporary textbooks reveals significant shifts in lexical choice, structural complexity, and emotional tone. While older texts emphasize collectivist ideals, propagandistic positivity, and accessible language, modern textbooks foreground individual experience, psychological depth, and morally or socially complex situations. Sentiment analysis highlights a shift in overall tone, with ROTEX-OLD textbooks characterized by dramatic, patriotic, and propagandistic themes, whereas ROTEX-NEW materials tend to incorporate a more individualistic perspective. However, this shifts to a rather pessimistic and sombre perspective, reflecting societal anxieties and existential concerns common in contemporary Eastern European literature. This shift in sentiment correlates with linguistic features, as modern textbooks exhibit higher lexical density, increased syntactic complexity, and a greater prevalence of abstract and negatively connoted vocabulary, which may further contribute to students' cognitive overload and reduced comprehension. These differences also interact with generational experiences, as students engage differently with materials shaped by distinct historical and ideological contexts. Furthermore, retaining canonical authors in the curriculum does not necessarily require reproducing all their most violent or morally challenging texts. Educators and curriculum developers can exercise selective inclusion, choosing works that exemplify the author's stylistic proficiency, thematic concerns, or cultural significance while minimizing exposure to disturbing content (take into consideration, for instance, *Adam and Eve* by Rebreanu or *The Place Where Nothing Happened* by Sadoveanu).

This study advocates for linguistics-supported textbook readability assessments as a vital tool for balancing linguistic complexity with pedagogical accessibility. By systematically analysing lexical fields, syntactic structures, and stylistic features, educators and curriculum developers can ensure that textbooks are not only intellectually challenging but also appropriately adapted to students' developmental and cognitive needs. Such assessments help identify potential comprehension obstacles, reveal shifts in tone or ideological framing, and provide evidence-based guidance for selecting or revising texts that maximize both engagement and learning outcomes. Moreover, readability analysis complements other corpus-based or computational methods, such as sentiment analysis, text classification, and topic modelling, offering a multidimensional view of how content, style, and structure interact in shaping the educational experience. Ultimately, integrating linguistic insights into textbook design and evaluation supports a more equitable, effective, and reflective pedagogy, allowing students to critically engage with complex texts while developing both cognitive growth and ethical awareness.

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Challenges Faced in Teaching and Learning Financial Literacy in the Economic and Management Sciences Curriculum

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Abstract

The study investigated the challenges faced by teachers and learners in the teaching and learning of Financial Literacy within the Grade 7–9 Economic and Management Sciences (EMS) curriculum in South African schools. Introduced under the Curriculum and Assessment Policy Statement (CAPS), EMS aims to equip learners with financial management skills and prepare them for Accounting from Grade 10. Despite this, learner performance in Financial Literacy remains poor, primarily due to overcrowded classrooms, limited teaching time, and difficulties with subject-specific terminology. Guided by a constructivist paradigm, the study adopted a phenomenology design and qualitative approach. Data were collected through semi-structured interviews with sixteen participants, including EMS teachers, heads of department, and a curriculum advisor from seven rural schools in Limpopo's Capricorn South District. Thematic analysis of the transcribed interviews identified five key challenges: limited teacher knowledge of Financial Literacy, large class sizes, insufficient teaching time, complex terminology, and restricted access to technological resources. These factors impede learner engagement and understanding, leading to low performance and reduced interest in commercial subjects. Teachers with minimal Accounting backgrounds struggle to explain abstract concepts, while overcrowded classrooms limit differentiated instruction and learner support. Inadequate access to technology further constrains interactive and engaging learning experiences. The study concludes that effective teaching of Financial Literacy requires enhanced teacher training, increased teaching time, smaller class sizes, and improved technological support. Addressing these challenges can strengthen instructional practices, improve learner outcomes, and foster greater financial competence, thereby advancing the broader objectives of the EMS curriculum.

Keywords:
Economic and Management Sciences, Financial Literacy, rural education, teacher challenges

1. Introduction

The purpose of this study was to explore the persistent difficulties encountered in teaching and learning Financial Literacy within the Economic and Management Sciences (EMS) curriculum. Although Financial Literacy constitutes a crucial aspect of EMS, both teachers and learners continue to experience notable difficulties in delivering and grasping this component effectively. Teachers are responsible for equipping learners with the skills to understand how individuals and communities can make efficient use of scarce resources to fulfil their needs and wants - an essential purpose of EMS. As outlined by the Department of Basic Education (DBE, 2011), EMS focuses on the responsible and effective management of resources to meet human requirements and aspirations. The curriculum comprises three key: Financial Literacy, The Economy, and Entrepreneurship. The Financial Literacy strand covers areas such as saving, budgeting, income and expenditure, accounting fundamentals, the accounting process, source documents, financial administration, and record-keeping (DBE, 2011).

Studies conducted by Jonda and Modise (2022) indicate that both teachers and learners face notable difficulties in the EMS teaching and learning process, with Financial Literacy being particularly challenging. The complex nature of Financial Literacy content is a major factor contributing to poor learner outcomes in the subject (Sentsho & Mudau, 2023). Learners frequently struggle to process and make sense of transactions, understand accounting concepts, and apply related knowledge (Siyaya et al., 2021), which often results in low achievement and diminishing interest in the subject. It is suggested that EMS teachers, during their undergraduate studies, typically had to choose only two majors from Economics, Business Studies, and Accounting (Jonda & Modise, 2022). This practice often leaves them with insufficient content knowledge and pedagogical skills for at least one of the three EMS components. Consequently, there is a pressing need to explore the obstacles faced in teaching and learning Financial Literacy to inform the development of interventions that could support both teachers and learners.

Teacher training programmes are generally intended to provide prospective teachers with an understanding of both subject content and effective pedagogical approaches (Taylor, 2019). This preparation is considered the stage during which teachers develop their instructional methods alongside their mastery of subject matter. Phillips and Condy (2023) emphasise that teacher education is designed not only to impart general teaching skills but also to prepare teachers to teach specific subject content competently. A teacher's understanding of the content significantly influences their preferences in lesson design and teaching strategies. This underlines the necessity for the educational system to strengthen teacher training, ensuring that teachers develop a thorough grasp of subject matter and effective instructional techniques to improve both teaching quality and learner outcomes in specific subjects (Rif'attullah & Ciptaningrum, 2024). Lack of comprehensive knowledge of a subject's structure can lead to the misrepresentation of both content and the intended learning outcomes. Often, EMS teachers are not Accounting specialists and are required to teach complex accounting topics with limited expertise, potentially generating misconceptions among learners (Agumba & Dasoo, 2024).

The efficacy of lessons in EMS also heavily depends on the allocation of sufficient time and the inclusion of appropriate teaching and learning resources (Nzuza et al., 2022). Given that EMS covers three interconnected domains, the time dedicated to the subject should allow adequate attention to each area. Current policy allocates only two hours per week to EMS - one hour for Financial Literacy and one hour for Entrepreneurship and The Economy - compared with five hours for Home Language, four and a half hours for Mathematics, and three hours for Natural Science (DBE, 2011). One hour per week for Financial Literacy is widely considered inadequate, given the subject's extensive content and multiple chapters. Research by Ndlovu (2022) indicates that insufficient time allocation negatively affects the quality of education, as teachers often prioritise finishing the syllabus instead of delivering fully developed lessons

Language of instruction presents another major barrier. The Language in Education Policy (Department of Education, 1997) prescribes that learners receive instruction in their home language during Grades R-3 and are introduced to English as a second language. As from Grade 4, English typically becomes the language of instruction. However, many African language-speaking learners struggle with this transition, as only a small proportion, approximately 7%, speak English at home. Consequently, English is used as the primary language for EMS and other subjects in most schools. This often impedes effective learning, particularly in the analysis and interpretation of Financial Literacy transactions. Siyaya et al. (2022) contend that learners' underperformance in EMS can be largely attributed to insufficient English language proficiency, including a limited understanding of subject-specific terminology. As learners demonstrate varying levels of English proficiency, from basic to advanced; their ability to grasp concepts, think critically, and communicate effectively directly influences their success in EMS (Siyaya, 2019). The specialised language of Financial Literacy further complicates comprehension. Learners frequently find the terminology unfamiliar and challenging to master. Phakathi (2018) highlights that learners often struggle to understand and internalise unique Financial Literacy concepts, making the acquisition of new knowledge difficult. These challenges are compounded when instruction is delivered in a second language, intensifying difficulties in understanding and applying subject content.

The transition from the National Curriculum Statement (NCS) to the Curriculum and Assessment Policy Statement (CAPS) in 2012 introduced additional teaching challenges, as curriculum content was revised without corresponding guidance on effective pedagogical strategies (Letshwene & du Plessis, 2021). Teachers are observed to have substantial potential to deliver EMS content, yet many face difficulties covering the full curriculum, particularly Financial Literacy, and express concerns about the complexity and breadth of content for Grades 8 and 9 (Mabusela, 2018). Weekly teaching requirements for Financial Literacy necessitate that teachers possess adequate knowledge of pedagogical strategies for Accounting. Molise (2021) notes that teachers' limited involvement in curriculum design can contribute to resistance to change, further complicating effective instruction.

Resource availability remains a significant obstacle for EMS teaching and learning. A lack of textbooks and other necessary educational resources compels teachers to depend on photocopied materials, which are often easily misplaced by learners prior to examinations (Fakude, 2022). Many schools prioritise textbook allocation for the Further Education and Training (FET) phase (Grade 10-12) at the expense of the Senior Phase (Grade 7-9) (Mabusela, 2018), leaving teachers to rely on chalkboard notes and

explanations during subsequent sessions due to scheduling constraints. Adequate access to textbooks covering key topics such as the general ledger, accounting equation, and cash/credit journals is crucial for effective learning.

Classroom overcrowding presents another critical challenge. Numerous public schools in South Africa experience classes exceeding the recommended teacher-learner ratio of 1:30 (West & Meier, 2020). In EMS, large classes hinder teachers' ability to achieve lesson objectives, reduce opportunities for individual attention, and affect teacher motivation, particularly when learners' abilities and backgrounds are diverse. Overcrowded classrooms restrict the time teachers can spend with individual learners and impede effective monitoring of activities (Molise, 2021). Noise levels can increase, requiring clear classroom management rules, yet overcrowding still obstructs teaching and learning. Classrooms remain central to intellectual and personal development, providing opportunities for interaction, skill acquisition, and the realisation of learners' potential (Tshangana, et al., 2023).

2. Theoretical foundation

The theoretical framework guiding this study is Cognitive Load Theory. This theory examines how the mental effort required by learners influences their capacity to process information and acquire knowledge, recognising that human memory has a limited storage capacity (Sweller, 2022). Cognitive Load Theory is particularly relevant to this research, as teaching Financial Literacy often involves complex concepts and calculations, such as general ledger accounts, which can place a significant cognitive burden on learners. By applying this theory, it becomes evident that learners may encounter difficulties in Financial Literacy when instructional methods impose excessive demands on their working memory, thereby hindering their understanding of intricate concepts.

3. Research methodology

3.1 Research Paradigm

This study was guided by a constructivist paradigm, which is suitable as it recognises that reality is not singular but constructed through individual experiences. Understanding the challenges involved in teaching and learning Financial Literacy required gathering and interpreting participants' perspectives to address the research questions. According to Kekeya (2019), the constructivist paradigm posits that people build their personal understanding and awareness of their environment through lived experiences and thoughtful consideration.

3.2 Research Design and Approach

As noted by Creswell and Creswell (2018), a research design is a fundamental element of any study, providing a structured plan for addressing research questions. It outlines the methods, participants, timing, and conditions under which data are collected. Given the difficulties encountered by teachers and learners in delivering and understanding Financial Literacy, this study adopted a phenomenological design and qualitative approach to gather data from participants, concentrating on these challenges within the EMS curriculum. In phenomenological research, the researcher sets aside personal assumptions and concentrates on understanding the participants' lived experiences (James & Bray, 2022). Qualitative research seeks to explore and understand concepts, opinions, and experiences in real-life contexts (Bhandari, 2024).

3.3 Participants

In this study, the population consisted of teachers and Departmental Heads from rural schools within the Sekhukhune South district of Limpopo Province. These individuals are most affected by challenges in the teaching and learning of Financial Literacy in Grades 8 and 9. A purposive sampling method was employed, selecting participants capable of providing rich, detailed information about the phenomenon (Makwana et al., 2023). Seven rural secondary schools in the Capricorn South District, Limpopo province, South Africa were selected. The sample comprised 16 participants, namely ten EMS teachers, five Departmental heads, and one curriculum advisor. Departmental heads oversee the departments to which teachers belong, while the curriculum advisor, based at the district offices, provides support to teachers within a specific subject. Given their educational experience, particularly in EMS Financial Literacy, their responses were expected to yield valuable information to address the research problem.

3.4 Data Collection Instruments

The choice of data collection instruments is essential for obtaining information that effectively addresses the research questions (Taherdoost, 2021). This study utilised semi-structured interviews to collect primary data. Semi-structured interviews allow participants to provide open-ended responses, sharing opinions, experiences, and insights. Husband (2020) notes that such interviews can capture teachers'

perspectives on their actual classroom contexts. Before conducting the main study, two EMS teachers and one Departmental Head, who were not part of the research sample, reviewed the interview guide to assess its clarity, leading to a few minor adjustments. The interviews, conducted at the participants' schools after teaching hours to avoid disruption, lasted approximately 20 minutes each, were audio-recorded, and subsequently transcribed. Departmental Heads provided insights regarding academic management challenges, complementing teachers' classroom perspectives.

3.5 Data Analysis

Data analysis involves examining collected information in ways that allow meaningful interpretation and understanding (Aguas, 2022). This study employed thematic analysis, which identifies and interprets patterns and recurring ideas within qualitative data (Flick, 2021). The recordings were listened to and the interview data transcribed, with similar statements grouped together to identify relevant categories. After reviewing participants' responses, ideas were categorised according to the main research question. The analysis entailed reviewing individual words and sentences to identify recurring themes and meanings. The descriptions were read multiple times to interpret the findings in connection with the challenges experienced in teaching and learning Financial Literacy within the EMS curriculum, and the themes were subsequently drawn from the transcriptions.

3.6 Ethical Considerations

The university Human Research Ethics Committee [CUT/REIC/20205/000587] and the Faculty Research and Innovation Committee granted ethical approval for the study. Permission was also sought from and granted by the Department of Basic Education in Limpopo province to conduct research in the selected schools. The study adhered to principles of voluntary participation, informed consent, anonymity, confidentiality, minimisation of harm, and responsible communication of findings.

4. Findings

Findings are discussed by means of themes derived from the data collected. Participants were given pseudonyms to guard their identity. Teachers were coded as T (from TA to TJ, representing Teacher A to Teacher J), Departmental heads as DH (from DHA to DHE, representing Departmental head A to Departmental head E), and the Curriculum Advisor as CA. The schools were numbered from School 1 to School 7. Accordingly, participants were coded as follows: School 1-TA, TB, and DHA; School 2-TC; School 3-TD, TE, and DHB; School 4-TF; School 5-TG, TH, and DHC; School 6-TI and DHD; School 7-TJ and DHE; and CA.

Theme 1: Inadequate Financial Literacy Knowledge among Teachers

One of the challenges identified as hindering the teaching of Financial Literacy was the prioritisation of the FET phase, where teachers specialising in Accounting are assigned to teach Grades 10 to 12, particularly Grade 12, while Grades 8 and 9 are often neglected. A participant noted that, although teachers with limited knowledge of Financial Literacy receive support through workshops and training, subsequent changes in teacher allocation by principals in the following year reduce the effectiveness of this training. The Curriculum Advisor (CA) highlighted that: *"Schools change teacher and subject allocation every year leading to the teacher development and training not being effective, considering the amount of content in Financial Literacy which requires recurring training".*

Additionally, participants highlighted that insufficient subject knowledge among teachers poses a significant challenge, particularly in Financial Literacy. Many noted that teachers assigned to teach EMS often lack a strong understanding of Accounting, which results in a disproportionate focus on other areas of the curriculum while Financial Literacy is neglected. School 5: DHC: *"The majority of the teachers assigned to teach EMS mainly focus on their strong points that are Business and Economics related".*

Another participant noted that teachers' limited understanding of Financial Literacy results in diminished enthusiasm for the subject, consequently leading to learners' weak achievement. School 3: DHB said: *"There are teachers who did not major in Accounting and lack knowledge of the Financial Literacy session which affects learners' performance, because they lose interest".* This was corroborated by a participant from School 3: TE, who admitted to struggling with complex Financial Literacy concepts. She said: *"I come across challenges with understanding complex Financial Literacy terminologies".* She noted that even teachers who had majored in Accounting often struggle to understand and explain certain terminologies. In contrast, another participant stated that he can teach Financial Literacy

effectively, as he is confident with numbers, despite not having specialised in Accounting. School 3: TD: *"Accounting is not my specialisation, but I am able to teach the Financial Literacy since I am good with numbers"*.

Departmental heads who participated in this study indicated that some teachers in their departments lack adequate grounding in the wider Accounting concepts necessary for the effective teaching of Financial Literacy. Additionally, some teachers isolate certain topics within Financial Literacy, while others omit the component entirely, preferring instead to focus on EMS areas in which they feel more confident.

Theme 2: Excessive Class Size

Most participants indicated that overcrowded classrooms present a major obstacle to the successful teaching and learning of Financial Literacy. One participant from School 2: TC shared that: *"I can't use different methods in classroom that is overcrowded. I am forced to teach all the topics using the same strategy, making it difficult to achieve the good results"*. As a result, the quality of teaching and learning is compromised. In contrast, another participant raised concerns about how overcrowding affects learners' comprehension of Financial Literacy, emphasising that a standard class size should be considered. School 5: TG: *"My classroom contains more than the normal class size number. The Department of Basic Education must follow the normal ratio for effective teaching and learning to take place"*. Also, another participant explained how disruptive and unruly learners become in an overcrowded classroom. School 5: TH: *"Learners become playful and disruptive, they even fight and lose focus. I am not always able to assist struggling learners"*. Sharing the same sentiment, another participant commented on how it becomes difficult to assist learners who can possibly need special attention. School 3: TE: *"It becomes difficult to give all the learners attention, especially the struggling ones"*.

A participant from School 1 stated that, despite the challenges of overcrowded classrooms, one-on-one sessions are not offered because he is the sole teacher for Grade 9. Consequently, learners are restricted to learning within the overcrowded classroom setting. School 1: TB: *"All my classes are overcrowded. Class size ranges between 65 to 75, and I do no not do one on one sessions since I am teaching grade 9 alone"*. Another participant noted that it is difficult to move between desks to provide learners with the individual support they need during activities. Other participants emphasised that, regardless of having excess class sizes, time also plays a part in hindering effective teaching and learning. School 1: TA said: *"Teaching Financial Literacy in an overcrowded classroom is the main problem, followed by not having enough time to access the learners, give feedback, and support the ones that struggle most"*. However, another participant asserted that overcrowding does not hinder classroom teaching and learning, provided the learners are disciplined. School 3: TD: *"I have never struggled to teach with too many learners in my class, since I can manage the classroom with a few or many learners"*.

In this study, most schools reported overcrowded classrooms, which affect how teachers deliver lessons, potentially limiting the use of preferred teaching methods such as class discussions or direct instruction. Teachers must employ high levels of classroom management and adapt their strategies to suit the environment, which may conflict with their professional development or preferred teaching approaches. Consequently, teaching objectives may not be met in overcrowded classrooms, as teachers are constrained in methods compatible with the school's environment rather than those best suited to the learners' needs.

Theme 3: Time Constraints

Participants were questioned regarding how time allocation affects the delivery and acquisition of EMS. Some participants emphasised that EMS encompasses three subjects, which are divided into two papers, and therefore, the time allocated should reflect the breadth of the content. School 6: DHD stated: *"EMS consists of paper one and two. The allocation needs to be adjusted to three hours to match the workload"*. Although a participant from School 5 shares the same sentiment, it was added that the other content subjects are allocated more time. School 5: TH stated: *"Financial Literacy needs more time allocation, like it is with the other subjects, like Natural Sciences and Social Sciences"*. Furthermore, some participants suggested that sufficient time should be provided to allow learners to scrutinise, make sense of, and record transactions, rather than merely adhering to the allocated time to complete the syllabus as prescribed in the Annual Teaching Plan (ATP). School 1: TB: *"The allocated time denies learners to effectively interpret all the transactions with classwork, and then they finish late while some never finish"*.

In addition, several participants reported that a considerable amount of time is spent breaking down

difficult concepts and transactions, which prevents teaching objectives from being fully achieved. This also limits the time available for learners to revise adequately before examinations. School 1: TA: *"We do not have sufficient time to go through all the contents while interpreting complex transactions"*. In agreement, School 1: DHA emphasised on the significance of revision and alluded on the increase of the allocated time. He said: *"The quantity of periods should be increased to 8 per week to enable teachers to finish the syllabus"*. The participant from School 7: DHE emphasised that Financial Literacy should be allocated more time, drawing a comparison with Mathematical Literacy, and stated that: *"In Mathematical Literacy, there is a topic of Financial Literacy which learners find challenging, when they don't understand Financial Literacy in EMS, they also struggle in Mathematical Literacy. More time is needed."*

A participant from School 5: DHC expressed the view that the only way to help learners catch up was by providing extra classes. He stated that: *"When a task has too many transactions, they cannot all be completed in one period. I create extra lessons to meet cover the remaining transactions"*. He further stressed that the design of the timetable does not allow continuous teaching and learning of Financial Literacy, *"The way my timetable is designed, one period is on Tuesday while the other is on Friday"*. In contrast, some participants noted that even though EMS is allocated three hours per week in their schools, this is still insufficient to teach effectively in an overcrowded classroom. School 2: TC said that: *"We have only two hours per week with over 70 learners in a classroom. This limits the number of assessments that can be given to learners. I struggle."*

The DBE mandates two hours per week for EMS, split between Financial Literacy and The Economy and Entrepreneurship (DBE, 2011). Consequently, teachers must adhere to this time allocation, even when it is insufficient. Teachers with limited knowledge in Financial Literacy or who are not fully trained for the curriculum face additional challenges in delivering the content effectively within one hour per week, potentially hindering learners' development of essential Financial Literacy skills.

Theme 4: Difficult Terminologies and Concepts in Financial Literacy

Participants highlighted challenges arising from the complex terminologies in the Financial Literacy component of EMS. Many participants reported similar difficulties, particularly with terms, concepts, and topics such as the Accounting equation. Learners often struggle to interpret transactions, especially when determining whether assets, owners' equity, or liabilities are increasing (+) or decreasing (–). School 2: TC said that: *"Learners often confuse the debiting and crediting in the Accounting Equation"*. Likewise, a participant from School 5: TH reported a similar experience, noting that learners not only struggle with interpreting and recording transactions but also face difficulties when transferring these transactions into the General Ledger, *"Usually learners who often get the transactions right, they fail to record the transactions in General Ledger."*

Another challenge identified was the complexity of Financial Literacy concepts and terminologies, which contributes to a decline in learners' interest in EMS. School 6: TI said that: *"Learners lack interest to learn Financial Literacy because it is very difficult for them"*. Participants further highlighted that the complexity of Financial Literacy concepts and terminologies also impacts teachers' ability to effectively deliver the content, regardless of their experience or qualifications. School 4: TF: *"Teachers find it challenging to deliver the Financial Literacy content even when they majored in Accounting"*.

In Financial Literacy, learners are expected to grasp key principles, memorise specific accounting concepts, and follow the six steps of the Accounting Cycle when recording transactions and performing calculations. The demanding nature of these processes can be overwhelming, making it challenging for learners to recall and apply the required steps accurately.

Theme 5: Access to technology in the teaching and learning of Financial Literacy

When questioned about the accessibility of technological tools for teaching Financial Literacy, participants indicated that the existing resources are inadequate to fully support learners. School 2: TC: *"Our school does not have enough technological resources to support the teacher and learners of Financial Literacy, including overhead projectors"*. Since the Capricorn South District schools that were sampled are located in rural areas, some participants stressed that learners do not have devices to support their learning, while others complained about not being able to afford the data bundles. School 3: TD said that: *"Our learners in the rural areas don't have smartphones to help them in the learning of Financial Literacy. Even those who have the phones, do not*

always have data bundles". The participant from School 3 mentioned that technological resources are available; however, those resources are not used in the teaching of Financial Literacy. School 3:TE: *"Our school has overhead projectors that are only used in other subjects. It seems that in this case, some subjects are more important than others".* Notably, the availability of overhead projectors does not guarantee that teachers will utilise them in their classrooms because of time limitations in EMS. School 1: TB: *"The time allocated for Financial Literacy does not allow us to use the overhead projectors much".*

In addition to the lack of mobile devices, learners who do have devices cannot afford the data bundles needed to support their learning. As a result, learning is limited to the classroom. School 3: TD: *"We do not have social media groups for learners because they complain about not having data bundles or airtime".* Despite the absence of overhead projectors, computers, and social media-based learning, participants emphasised the importance of these resources in supporting the teaching and learning of Financial Literacy. School 4: TF: *"Technology is a great tool to use to enhance Financial Literacy because it helps learners to learn to be active in the classroom".*

Teachers in this study reported that they are not provided with technological resources such as overhead projectors and smartboards, and that the procurement of these resources is not included in school budgets. Consequently, it becomes the requirement of the Department of Basic Education to allocate sufficient funds for acquiring technological sources essential for teaching Financial Literacy. In the absence of such resources, teachers remain unskilled in utilising Information and Communication Technologies (ICT) to enhance teaching and learning. Additionally, inadequate funding for EMS may contribute to shortages of other critical teaching and learning materials.

5. Discussions

Poor learner performance in EMS is partly due to teachers' limited content knowledge in Financial Literacy. EMS is often assigned to teachers who did not specialise in Accounting, one of the most critical components of the curriculum. Furthermore, teachers who do specialise in Accounting are typically allocated to teach Grade 12, leaving Grades 8 and 9 with teachers who are potentially underqualified in terms of the needed specialisation. This observation aligns with Fakude (2021), who found that many EMS teachers struggle with topics such as the general ledger and accounting equation within Financial Literacy, particularly in the lower grades. It was also noted that EMS teachers tend to focus on areas in which they feel confident, such as The Economy and Entrepreneurship, while Financial Literacy, where they feel less secure, is largely neglected. This is supported by Nkabinde (2021), who observed that teachers often isolate the teaching of Financial Literacy. Importantly, the study revealed that even teachers specialised in Accounting encounter difficulties in explaining complex concepts to learners.

A conducive classroom environment cannot be achieved when classrooms are overcrowded. This negatively impacts on learner performance and can result in poor academic outcomes in EMS, particularly in Financial Literacy, which is practical in nature and requires learners' focused attention. When teachers are unable to move between desks to support learners during assessments and ensure that each learner is engaged, learners tend to become relaxed, playful, and noisy. This is reinforced by Tshangana et al (2023), who emphasise that teachers aim to interact effectively with each learner, manage classroom activities, and provide opportunities for skill development and potential to be realised, all of which require a high level of classroom management. Financial Literacy lessons demand a conducive classroom with a manageable class size to be delivered successfully. Overcrowded classrooms hinder the teaching and learning process, whereas normal class sizes make it possible to achieve teaching and learning objectives. Köhler (2020) confirms that class size affects learner performance, with smaller classes leading to better outcomes.

Overcrowded classrooms create a negative learning environment. Marais (2016) states that teaching under such conditions presents considerable challenges in creating positive learning environments in which appropriate teaching and assessment approaches are crucial. Participants expressed concerns about class sizes of 65 to 75 learners, suggesting that a normal class ratio is necessary to achieve desirable results. This view aligns with West and Meier (2020), who argue that educational goals are difficult to attain if class sizes are not considered. Additionally, overcrowded classrooms tend to be noisy and disruptive, requiring strong classroom management skills. Molise (2021) further notes that teachers need to establish rules to control noise levels in such settings.

In terms of time allocation, EMS is allocated only two hours per week, as prescribed in the CAPS document. According to DBE (2011), these two hours are divided equally, with one hour for Financial Literacy and another for Entrepreneurship and The Economy. Participants proposed that the Department of Basic Education must consider that EMS comprises three subjects and that each subject should be adequately accounted for when allocating time. They further emphasised that Financial Literacy should receive additional time due to its complexity. These observations align with Fakude (2021), who notes that the extensive Financial Literacy content requires substantial time to ensure continuity in teaching and to prevent disruptions caused by limited time. Teachers also expressed dissatisfaction with school timetables, which do not support continuous teaching of EMS, a concern echoed by Phakathi (2018), who highlighted that teachers struggle with the allocated two hours per week.

The limited time allocation for EMS, combined with the extensive curriculum content, prevents them from completing the syllabus or conducting adequate revision before examinations. Covering all CAPS-specified topics within the allotted time poses a significant challenge (Nzuza et al., 2022), potentially affecting learner performance. Ndlovu (2022) asserts that insufficient time allocation negatively impacts the quality of education. To mitigate this, some teachers conduct extra classes to ensure the syllabus is completed and learners have sufficient time for revision. Mabusela (2018) supports this approach, recommending that teachers collaborate with learners through additional classes.

Learners experience significant challenges with Financial Literacy terminology, particularly when interpreting and accurately recording transactions in the relevant accounts. This is corroborated by Ngwenya et al. (2020), who found that learners often encounter unfamiliar language in Financial Literacy, making the terminology difficult to grasp. Consequently, learners may lose interest in the subject and develop negative attitudes towards it, a point supported by Jonda and Modise (2022), who noted that difficulties with Financial Literacy concepts can contribute to ongoing poor performance in EMS. Learners also face practical challenges, such as drawing up columns in activity books due to a lack of provided workbooks. Furthermore, while some EMS teachers possess knowledge of Financial Literacy, they often struggle to explain concepts effectively, which impedes learners' achievement of the intended learning objectives.

Teachers acknowledge the importance of supplementary sources to create an engaging Financial Literacy classroom experience where learners are sufficiently stimulated. However, there is a notable shortage of hardware resources, such as projectors, computers, and other essential equipment. Mdhlalose and Mlambo (2023) emphasise that hardware resources are a crucial technological component required for effective teaching and learning, including tools such as laptops, computers, video machines, mobile phones, data projectors and smartboards. Although teachers recognise the potential of social media platforms to improve the learning experience in Financial Literacy, many learners lack access to suitable devices, and those who do often cannot afford the data bundles required for active participation. This is reinforced by Ndlovu (2022), who emphasised that digital tools, including platforms such as WhatsApp, Facebook, YouTube, Zoom, Skype, Google, and Microsoft Teams, are widely utilised by secondary school teachers and learners to support learning.

6. Conclusions

The purpose of this study was to explore the difficulties faced by EMS teachers and learners in teaching and engaging with Financial Literacy within the CAPS curriculum. The findings indicate that the principal challenges include insufficient teacher knowledge, overcrowded classrooms, limited time allocation, complex subject terminology, and inadequate access to technological resources. Collectively, these challenges impede effective curriculum implementation and contribute to learners' continued underachievement in Financial Literacy.

A key conclusion is that a lack of subject expertise among EMS teachers significantly restricts their ability to teach Financial Literacy with confidence and depth. Teachers without an Accounting background often avoid Financial Literacy topics or rely on traditional, teacher-centred methods that do not foster conceptual understanding. Overcrowded classrooms exacerbate these issues, limiting opportunities for learner participation, feedback, and individual support, which ultimately diminishes the quality of learning.

Furthermore, restricted time allocation for EMS lessons hinders teachers from covering the required Financial Literacy content and providing learners with adequate opportunities to practise essential accounting skills. The technical language and terminology used in

Financial Literacy pose an additional challenge, particularly for learners who are taught in a language that is not their first. Similarly, limited access to technology and digital learning resources in rural schools reduces opportunities for interactive, engaging, and learner-centred instruction.

It is therefore concluded that improving Financial Literacy education requires ongoing professional development for EMS teachers, fair distribution of educational resources, and curriculum reform to ensure sufficient instructional time. Future research should explore the effectiveness of teacher development initiatives, the integration of ICT in Financial Literacy teaching and learning, and practical approaches to managing class sizes to foster a more inclusive and effective educational setting in South African schools.

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Beyond Scale Expansion: Exploring the Structural Imbalances in China's Transnational Higher Education through the Lens of Resource Dependence Theory

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Abstract

China's transnational higher education has achieved significant growth in scale; yet its rapid expansion may conceal the deep-seated structural problems. In this study, we conducted a comprehensive quantitative analysis based on official statistical data, aiming to map the current development landscape of Chinese-Foreign Cooperation in Running Schools and identify the problems and challenges. The research has revealed four key structural imbalances: imbalanced distribution of program levels; imbalanced disciplinary distribution; dual imbalance in partner countries and foreign university levels and imbalanced geographical distribution. Drawing on resource dependence theory, our analysis demonstrates that these imbalances are the inevitable result of the asymmetric dependence relationship formed by Chinese and foreign partner universities in the process of pursuing key resources. Although this research focuses on the Chinese context, it has broader implications for transnational higher education worldwide. Five implications for policy and practice have been proposed at the end of this article.

Keywords:
Chinese-foreign cooperation in running schools, imbalance, resource dependence theory, transnational higher education

1. Introduction

Transnational Higher Education (TNHE) has become a key driving force for the internationalization of higher education, profoundly reshaping the landscape of global knowledge production and dissemination (Knight, 2008). The international framework constructed by the General Agreement on Trade in Services (GATS) has institutively paved the way for the global marketization and cross-border practice of educational services (Hou et al., 2014). Driven by this, many developing countries (such as China, Vietnam, Malaysia, and the United Arab Emirates) have become importers of educational services, actively introducing projects and resources from major educational exporting countries such as the United States, the United Kingdom and Australia (Altbach & Knight, 2007). From the establishment of a branch campus by the University of Nottingham in Malaysia, to the layout of New York University in ABU Dhabi and Shanghai, and to the thousands of cooperation projects among countries, TNHE is reshaping the global education landscape.

TNHE is regarded to be a reform measure that China takes to respond to globalization and meet the demand of students for tertiary education opportunities and the economic development (Mok & Han, 2016). As one of the largest emerging higher education markets in the world, China has accumulated a huge volume of Chinese-foreign cooperative education practices over the past four decades, providing a unique sample for the world to observe how TNHE evolves in specific social, political and economic contexts (Yang, 2008). In China, TNHE mainly stands for Chinese-Foreign Cooperation in Running Schools (CFCRS) (Zhongwai Hezuo Banxue). It has been playing an important role in promoting the educational quality, expanding international exchanges, and introducing high-quality educational resources (Hou et al., 2014; Yang, 2008). There are only subtle differences in meaning between CFCRS and TNHE in Chinese higher education (Hu & Willis, 2017), therefore, these two terms will be used interchangeably in this article for the convenience of discussion.

As Mok (2021) contends, there are two types of transnational cooperation in the Chinese higher education context: CFCRS programs and CFCRS institutions. Institutions are joint venture educational entities that can be either non-independent schools or colleges connected to a Chinese parent university (e.g. Jilin University Lambton College) or fully independent universities with their own legal person status (e.g. The University of Nottingham-Ningbo).

CFCRS programs, on the other hand, are curriculum-based collaborations that do not create a distinct legal entity. Both forms involve collaboration between Chinese and foreign universities, including partners from Hong Kong and Macau.

Currently, the structural problems and deep-seated challenges that have long been overshadowed by the growth in quantity of CFCRS have become increasingly prominent. These challenges not only concern the fairness, quality and sustainable development of higher education in China, but also pose significant questions to the theory and practice of global TNHE. Therefore, it is of urgent importance to closely examine these issues.

The literature has shown that scholars have conducted fruitful studies on TNHE in China from various dimensions. For instance, some focused on the governance model and policy evolution (Mok & Han, 2016), while others delve deeply into micro-level issues such as cross-cultural teaching and student experience in TNHE (Hou et al., 2014). Recent systematic literature reviews have also pointed out the common challenges faced by global TNHE, such as quality assurance, cultural adaptation, and commercialization (Tran et al., 2023). Although existing studies have explored specific aspects of TNHE in China, they mostly rely on policy text analysis, qualitative research, case studies or small-scale questionnaire surveys, lacking comprehensive and macroscopic quantitative analysis based on official authoritative statistical data. Therefore, it is difficult to reveal the systematic and structural problems and deficiencies of CFCRS in China. Filling this gap is of vital importance as it can elevate our understanding of the issue from fragmented case observations and partial knowledge to an accurate grasp of the overall situation, thereby providing a solid empirical foundation for more precise policy intervention and theoretical interpretation.

This study aims to map the landscape of China's TNHE based on the latest official statistics from the Information Platform for Supervision of CFCRS of the Ministry of Education of China, identify the predominant problems, and analyze the reasons in combination with the Resource Dependence Theory (RDT). Therefore, the major research questions of this study are:

1) What are the predominant challenges and problems characterizing the current landscape of TNHE in China?

2) What are the reasons for these challenges and problems in the light of RDT?

Through this research, we expect to provide policymakers with data-based evidence support to help identify the optimization direction of resource allocation and development strategies. At the same time, it contributes systematic empirical analysis from China to international TNHE research, enriching the comparative research materials on the internationalization of global higher education.

2. Theoretical foundation

RDT originated from management and organizational behavior. It claims that the survival of an organization depends on external resources, and thus its behavior is shaped and influenced by the availability of these resources (Pfeffer & Salancik, 2003). Pfeffer and Salancik (1978) contend that: 1) the most important thing for an organization is survival; 2) organizations need resources to survive, but they usually cannot produce these resources on their own; 3) the organization must interact with the factors in the environment it relies on, and these factors usually include other organizations; 4) survival is thus based on an organization's ability to control its relationships with other organizations. An important feature of the RDT is that dependencies can be mutual. Just as one organization depends on another two organizations can also depend on each other simultaneously. When the dependence of one organization exceeds that of another, power becomes unequal (Ma, 2005). Organizational dependency not only includes resource dependencies such as technology and knowledge, but also dependencies in aspects such as organizational structure, culture, and relationship network (Jiang et al., 2024).

RDT provides a powerful and brand-new perspective for explaining the behavior of public higher education institutions (Fowles, 2014). Elaborating the relationship between universities and the environment, Sun (2016) deems that we mainly emphasize four typical resources: finance, human resources, information and knowledge (research and development achievements and evaluation plans), as well as products and services. Dependence is understood as the degree of demand for resources and the availability of resources in an environment (Frooman, 1999). If a university cannot obtain the resources controlled by other institutions and at the same time cannot acquire these resources from elsewhere through other means to achieve its own operational goals, it can only rely on other institutions.

RDT aligns with the core logic of CFCRS well, which is why it has been chosen as the theoretical lens for this research. RDT holds that the survival and development of any organization must rely on key resources in the external environment. CFCRS is precisely a strategic alliance formed by both Chinese and foreign universities to obtain their own resources needed, and it is a resource exchange with programs or institutions as the carrier of cooperation. Chinese universities aim to introduce high-quality courses, advanced pedagogical ideas and academic reputations. Foreign universities, on the other hand, aim to tap into the Chinese market, attract students and generate income. Therefore, this theory regards cooperative education as a rational behavior of resource exchange, providing the most direct theoretical perspective for analyzing its driving forces.

3. Research methodology

Data for this study was obtained from the Information Platform for the Supervision of CFCRS (https://www.crs.jsj.edu.cn/), which is supervised by the Department of International Cooperation and Exchange of the Ministry of Education in China. It is currently the only officially designated channel by the Chinese government for administrative licensing, quality supervision and information disclosure of CFCRS. The main reasons for choosing this website are:

Legal validity: In China, all legal CFCRS institutions and programs approved or reviewed by the Ministry of Education must be registered and publicly displayed on this platform. Educational activities not included on this platform do not have legal effect. Thus, this database eliminates the interference of informal educational activities and can precisely define the boundary of research samples.

Comprehensiveness of information: The website comprehensively collects key fields such as the educational entity, foreign partner universities, educational levels (undergraduate/postgraduate), distribution of disciplines and majors, and educational locations, etc. This provides detailed and accurate first-hand data support for this research to quantitatively analyze the structural characteristics of CFCRS programs and institutions from multiple dimensions.

Currency of the data: The website data is updated in real time based on the approval and review results of the Ministry of Education, covering the existence status of the educational entity (such as enrollment in progress, suspension of enrollment, etc.), ensuring that the analysis of this study is based on the current effective educational status.

All the raw data collected was entered into Microsoft Excel, forming the basic database of the research. The core of the analysis process is to conduct multi-dimensional classification and quantitative comparison of data. Based on the research objectives, All programs and institutions should be classified according to five key dimensions: the location of the school (Eastern, Central, Western, Northeast), the discipline category (such as Engineering, Management, Art, etc.), the educational level (undergraduate, postgraduate), the foreign partner country (by country), and the level of the foreign partner university (stratified by referring to authoritative rankings such as QS World University Rankings).

Following this, we conducted frequency statistics and percentage calculations for different categories under each dimension, thereby clearly outlining the quantitative distribution characteristics of TNHE at all levels. Through the horizontal and vertical comparisons of these quantitative results, this study was able to precisely identify and verify the current structural imbalance phenomena, providing a solid empirical basis for subsequent theoretical analysis.

4. Results

Based on a systematic analysis of the collected data, we identified several key challenges and problems, all of which were related to imbalance.

4.1. Imbalanced distribution of program levels

The statistics have shown that among the total 1,195 CFCRS programs, there are as many as 994 undergraduate-level programs, accounting for 83.18%. In sharp contrast to this is the weakness of postgraduate education. There are currently 178 master's degree programs, accounting for 14.9%. Doctoral programs are even fewer, with only 23, accounting for merely 1.92%. This structure characterizes the reality that CFCRS is often positioned as a supplement to undergraduate educational resources rather than serving as a platform for participating in the production of global cutting-edge knowledge and cooperation in advanced technologies.

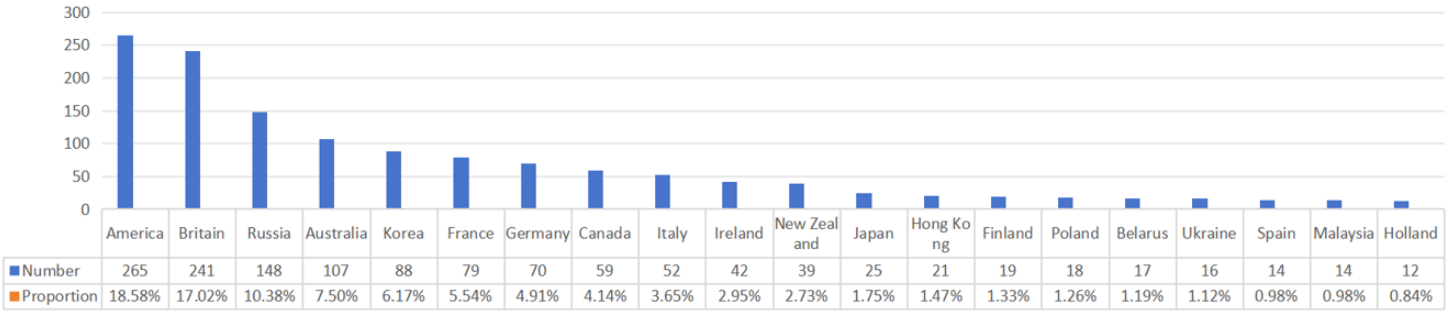
4.2. Imbalanced disciplinary distribution

The country distribution of foreign collaborators reflects the diversity of educational resources and the breadth of a global perspective. Figure 1 shows that

the international partners of CFCRS in China are highly concentrated in traditional Western educational powerhouses, and most of the cooperating countries are developed countries in the world, with a serious lack of diversity.

Figure 1

Distribution & Proportion of the Foreign Partner Countries



	America	Britain	Russia	Australia	Korea	France	Germany	Canada	Italy	Ireland	New Zealand	Japan	Hong Kong	Finland	Poland	Belarus	Ukraine	Spain	Malaysia	Holland
Number	265	241	148	107	88	79	70	59	52	42	39	25	21	19	18	17	16	14	14	12
Proportion	18.58%	17.02%	10.38%	7.50%	6.17%	5.54%	4.91%	4.14%	3.65%	2.95%	2.73%	1.75%	1.47%	1.33%	1.26%	1.19%	1.12%	0.98%	0.98%	0.84%

Specifically, the total number of CFCRS programs with the United States (265) and the United Kingdom (241) exceeds 500, thus these two countries have become the main partners of cooperation. Russia (148) and Australia (107), which follow closely behind, also have a considerable gap compared to the top two. The programs of the top four countries accounted for the majority (63.68%) of the total, forming a highly concentrated core circle of "the United States, the United Kingdom, Australia and Russia". In contrast, the participation of other European countries such as Germany (70) and France (79) was limited, and the number of collaborators from countries along the Belt and Road and the vast number of developing countries was even smaller, such as Malaysia (14).

4.3. Dual imbalance in partner countries and foreign university levels

Chinese universities are the main body of CFCRS, and the degree of their participation directly determines the overall quality and development scale of CFCRS. Our data shows that as of June 2025, there were a total of 1,365 higher education institutions at the undergraduate level and above in China (Ministry of Education of the People's Republic of China) http://www.moe.gov.cn/jyb_xxgk/s5743/s5744/202506/t20250627_1195683.html), of which 586 universities hosted CFCRS, the overall participation rate is 42.93%, More than half of the universities are still not implementing CFCRS. This indicates that for the majority of Chinese universities, CFCRS is deemed to be a supplementary activity, not an essential component of their mission. As a result, the popularity and influence of CFCRS are fundamentally restricted, and the capacity for international cooperation needs to be enhanced.

As the provider of high-quality educational resources, the academic level and international reputation of foreign universities are important guarantees for the quality and academic level of CFCRS. According to the statistics of this study, among 1,453 institutions and programs, the number of foreign partner universities ranked among the top 500 in global university rankings is 306, accounting for 21.1%. In other words, nearly 80% of the foreign partners universities are ranked outside the top 500 in the QS World University Rankings. This not only restricts the overall quality improvement of CFCRS, but also reveals that certain Chinese universities may have a tendency to prioritize quantity over quality in the selection of partners, which in turn leads to the overall unsatisfactory results of CFCRS.

To further explore the quality structure of foreign partners, we conducted an investigation on the top 20 universities outside the Chinese mainland with the largest number of collaborations. It can be seen from Table 1 that a significant structural differentiation is presented. We have observed that there are indeed some of the world's elite research universities in the cooperation, such as the University of New South Wales (ranked 19th by QS) and the University of Manchester (ranked 34th by QS), which indicates that the elite education that oriented towards knowledge introduction and improvement of teaching quality does exist. However, another noteworthy phenomenon is problematic. A large number of institutions ranked in the lower-middle range or even failing to make it into the rankings still establish cooperative relationships with many Chinese universities by virtue of their proactive international market strategies. For instance, Southern Cross University, which has six cooperative programs/institutions, ranks 576th, while Anglia Ruskin University and the University of Bolton even failed to enter the QS 2025 ranking. This phenomenon profoundly reveals the "dual-track motivation" that drives CFCRS: one is the "elite-

driven" centered on academic reputation, and the other is the "business-driven" centered on market expansion and tuition income. It is precisely the extensive existence of the latter that has led to the macro situation mentioned earlier where nearly 80% of the foreign partners rank outside the top 500, thereby undermining the overall reputation of CFCRS and posing a potential educational quality risk to students.

Table 1

Top 20 Foreign Partner Universities by Number of Programs and Institutions (with QS 2025 Rankings)

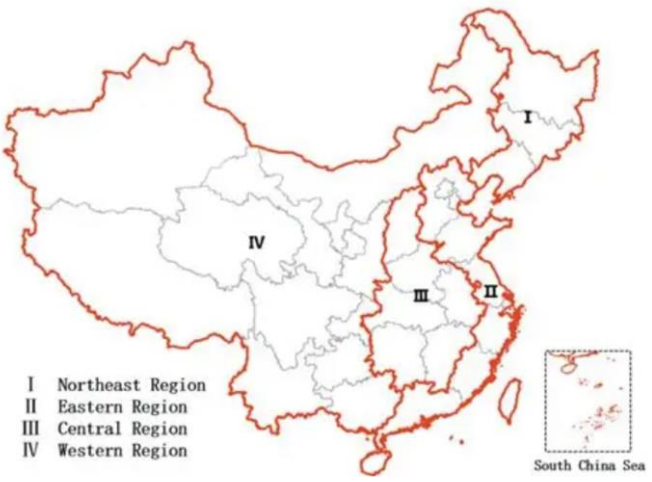
No.	University	No. of Programs & Institutions	Ranking
1	The Hong Kong Polytechnic University	10	57
2	State University of New York	10	460
3	University of Wisconsin System	9	116
4	Queen Mary University of London	8	120
5	University of Reading	8	172
6	University of Wollongong	8	167
7	University of Arizona	7	293
8	University of Manchester	6	34
9	University of Tasmania	6	293
10	Royal Melbourne Institute of Technology University	6	123
11	Anglia Ruskin University	6	—
12	University of Greenwich	6	691-700
13	Southern Cross University	6	576
14	University of British Columbia	6	38
15	Charles Sturt University	6	851-900
16	The University of New South Wales	5	19
17	University of Canberra	5	403
18	Curtin University	5	174
19	Victoria University, Melbourne, Australia	5	741-750
20	University of Bolton	5	—

4.4. Imbalanced geographical distribution

According to National Bureau of Statistics, China is divided into four economic regions: the Northeast, Eastern, Central and Western regions. Figure 2 details the four regions and the Provinces/Autonomous Regions/Municipalities that each region comprises. During the rapid development of CFCRS, the imbalance in regional development has become a predominant issue, which is mainly reflected in the scale of education, the level of education, and the quality of participation and cooperation of universities.

Figure 2

The Economic Regions and Provinces



Region	Provinces/Autonomous Regions/Municipalities
Northeast	Liaoning, Jilin, Heilongjiang
Eastern	Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan, Taiwan, Hong Kong, Macao
Central	Shanxi, Anhui, Jiangxi, Henan, Hubei, Hunan
Western	Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang

Source: Zhang, G., Guo, X., Li, D., & Jiang, B. (2019). Evaluating the potential of LJ1-01 nighttime light data for modelling socio-economic parameters. Sensors, 19(6), 1465.

4.4.1. Scale of Provision

From the perspective of the regional distribution of CFCRS, the Eastern region has the largest number of institutions and programs, accounting for 51.36% of the national total. The Central region (20.65%) ranked second, but there was still a considerable gap compared with the Eastern region. The Northeast region and the Western region have similar numbers, accounting for 13.34% and 14.66% of the national total respectively. Overall, in terms of the scale of provision, there is an unbalanced situation where there is more in the Eastern region but less in the Central, Western and Northeast regions.

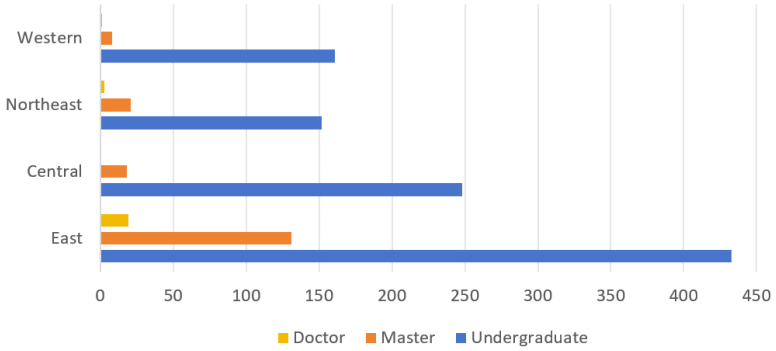
4.4.2. Education levels

As shown in Figure 4, a significant regional disparity exists in the educational levels of programs. The Eastern region leads in the number of undergraduate, master's, and doctoral programs,

hosting the vast majority of the nation's scarce PhD programs. In contrast, the Central, Northeastern, and Western regions exhibit a severe shortage of postgraduate provisions. This issue reflects the obvious weakness of these three regions in high-level educational cooperation. The eastern region has basically acquired the capacity to cultivate students at the undergraduate, postgraduate and doctoral levels in Sino-foreign cooperative education, while the Central, Northeastern, and Western regions are still confined to the undergraduate-level cooperation.

Figure 3.

Distribution of Educational Levels



4.4.3. University participation

In terms of the participation of universities in CFCRS, there is a regional pattern where the Eastern region leads and the Central and Western regions lag behind. Table 2 illustrates the number of universities offering CFCRS programs or institutions in different regions of China and their proportion relative to the total number of universities in the corresponding regions.

Table 2

Number and Proportion of Universities with CFCRS Programs/Instructions by Region

Region	No. of universities	No. of universities with CFCRS programs or institutions	Proportion
Eastern	551	282	51.18%
Central	321	125	38.94%
Northeastern	144	77	53.47%
Western	349	102	29.23%
Total	1,365	586	42.93%

Our data shows that not only are there a large number of universities in the Eastern region, but also a high number of universities offering CFCRS programs and institutions. The overall participation rate is significantly higher than that in the central and western regions. Moreover, the Eastern region also contains a large number of key universities. These universities often manage to attract higher-level partner universities when cooperating with foreign parties, and thus develop higher-quality cooperation programs.

The overall participation rate of universities in the Central region is relatively low. However, in certain provinces, such as Henan, 37 out of 62 universities participated, with a participation rate of approximately 60%, while in Shanxi Province, only 2 out of 36 universities participated, with a participation rate of less than 6%. It is evident that there are significant internal differences in terms of university participation in the Central region. The overall participation rate in the western region is the lowest, but similar to that in the Central region, there are obvious internal differences. The Northeast region is special, since only three provinces in this area (see Figure 3) and the number of colleges and universities here is small. Although there are 77 universities in these three provinces that offer CFCRS programs or institutions, which is not a large number, the participation rate of 53.47% is still slightly higher than that in the Eastern region.

5. Discussions

In this section, we provide an in-depth analysis of the reasons for the problems and challenges identified previously in the findings through the lens of RDT.

5.1. Imbalanced distribution of program levels

An excessive proportion of undergraduate-level CFCRS programs profoundly reflects the differences in the resource dependence patterns between China and foreign countries. For Chinese universities, undergraduate-level CFCRS can directly bring many resources that universities rely on, such as tuition fees, student enrollment scale and domestic and international reputation. In terms of cost, such undergraduate programs have lower requirements for resources and a faster return of funds. On the part of foreign universities, expanding the undergraduate education market in China means obtaining a stable stream of tuition income and student sources. This is an important strategy for Western universities, which are facing the pressure of shrinking domestic higher education markets, to reduce the uncertainty of resources and the environment.

In contrast, master's and doctoral education has much higher requirements for resources compared to undergraduate education. It not only needs high-level faculty and advanced research equipment, but also a wealth of research projects and academic resources. Although domestic universities are eager to develop master's and doctoral education, most of them lack resources and intend to rely on cooperative education to introduce resources from foreign partners. However, foreign universities tend to concentrate their high-quality resources in the domestic market in order to maintain their position in international academic competition. Therefore, their intention to hold master's and doctoral level cooperative programs is weak. From the perspective of resource dependence, Chinese and foreign universities have formed an asymmetric dependence relationship here (Sun, 2016).

5.2. Imbalanced disciplinary distribution

Slaughter and Leslie (1997) pointed out that the funders of higher education have a huge influence on universities because they provide the funds and resources needed for the operation of universities. From the perspective of Chinese universities, undergraduate education carries the largest student source scale and constitutes the main source of key financial resources such as tuition income and fiscal appropriation. As universities increasingly rely on tuition fees as a source of income, according to resource dependence, they will have to cater to students' preferences for survival and development (Fowles, 2014), that is, tilt towards the preferences of "resource providers". Graduates with backgrounds in engineering, management, art, etc. have bright employment prospects and considerable salary, which can bring a continuous and stable source of students and tuition income. This is precisely the key financial resource for maintaining the operation of CFCRS programs and institutions. In terms of knowledge characteristics, the knowledge systems of these disciplines have strong features of standardization and portability, and they face relatively low costs in the cross-border transfer of information and knowledge resources. Organizational dependency not only includes resource dependencies such as technology and knowledge, but also dependencies in aspects such as organizational structure, culture, and networks (Jiang et al., 2024). The humanities and social sciences are highly dependent on cultural customs, values and academic traditions. The cross-border transfer of their teaching content faces cultural adaptation costs and ideological risks. This reliance on local culture and relationship networks makes it difficult to directly transplant educational content from other countries into domestic cooperative education, and the cooperation between China and foreign countries in the field of humanities and social sciences also faces higher coordination costs.

According to RDT, if an organization particularly needs a certain type of resource but it is difficult to obtain such resources from outside, it will attempt not to rely on external institutions. In the field of humanities and social sciences in China's higher education, due to the particular sensitivity to ideological security, regulatory authorities and universities are particularly cautious in their international cooperation. They are more willing to invest resources in disciplines such as engineering and management, which are less likely to cause political disputes and can also yield economic returns. As a result, these disciplines are getting stronger and stronger, while the development of other disciplines is restricted. The overall disciplinary layout is thus becoming increasingly unbalanced.

5.3. Dual imbalance in partner countries and foreign university levels

The fact that most TNHE relationships are concentrated in Europe and America, and that Chinese universities often cooperate with foreign universities of average instead of high level, reflects the power structure under asymmetric dependence. In the global higher education system, developed countries in Europe and America exert dominant influence over key areas such as the degree system, quality certification and scientific research evaluation standards. Their universities represent high-quality academic resources certified by international ranking systems. For Chinese universities, the higher education resources in Europe and America have high symbolic value and legitimacy. They not only have instrumental functions (improving teaching quality), but also symbolic value, which can significantly enhance the reputation of institutions, attract high-quality students and obtain policy support. In contrast, although cooperation with countries along the Belt and Road Initiative or developing countries holds strategic significance in a geopolitical sense, due to the relatively low symbolic value and market recognition of their educational resources, it is difficult to meet the reliance of Chinese universities on key resources, resulting in insufficient cooperation motivation among Chinese universities.

RDT holds that dependence can be mutual, but when one party is more dependent on the other,

inequality of power occurs (Pfeffer and Salancik, 1978). High-level universities abroad (such as those ranked within the top 500 in the QS University Rankings) possess abundant and scarce tangible and intangible resources, including outstanding academic reputation, brand value, knowledge production capacity, advanced instruments and equipment, teaching and research achievements, etc. Chinese universities have a high demand for these resources, while top foreign universities have a relatively low demand for resources in the Chinese market, forming a typical asymmetric dependence relationship. According to RDT, this power structure grants leading foreign universities greater bargaining power. Consequently, they are thus inclined to form equitable partnerships with top-tier Chinese institutions, while showing little incentive to respond to collaboration proposals from ordinary universities. However, the reality is that these top-tier foreign universities have very few cooperative institutions, programs or branch campuses in various countries around the world (not limited to China). Perhaps, for the sake of reputation and quality, they are more willing to develop their own universities well and attract outstanding students from all over the world to study there, rather than developing cooperative programs or institutions in other places of the world and "diluting" their academic reputation and educational quality. On the other hand, many mid- to lower-tier foreign universities are under survival pressure due to the decline in local students and fiscal austerity. They are highly dependent on China's vast higher education market. This inequality of power has led to a lack of cooperation motivation among high-level foreign universities, while medium and low-level universities have shown high enthusiasm. In order to meet the internationalization targets as legitimacy, Chinese universities may have to accept the reality of cooperating with mid- to lower-tier foreign universities, which has led to the current situation where the overall level of foreign collaborative universities is not high.

5.4. Imbalanced geographical distribution

The imbalanced geographical distribution is a direct manifestation of the significant differences in development levels and resource possession among various regions in China. It profoundly reflects the decisive impact of the different resource endowments among regions on local organizations. The eastern region has a developed economy and abundant educational resources, with more high-level universities and research institutions. Universities, with their abundant financial resources, dense international relations networks, superior geographical locations and open policy environments, have significant advantages when establishing resource exchange relations with foreign parties. Regarding the four typical resources of the relationship between universities and the environment emphasized by Sun (2016), universities in the eastern region have stronger resource supply capabilities in the four dimensions of finance, human resources, information and knowledge, as well as products and services. They can provide foreign partners with better educational conditions, broader market prospects and more abundant supporting resources. This will reduce the risk of resource input for the foreign side and make the interdependence between the two sides more balanced. This resource advantage forms a cumulative Matthew effect. To a certain extent, Chinese and foreign universities have formed a joint dependence relationship. They all obtain irreplaceable resources from cooperation, and the degree of dependence is relatively close (Emerson, 1962).

Unlike the eastern regions, the central and western regions as well as the northeastern regions of China are at a disadvantage in terms of existing resources and find it difficult to provide the key resources needed by foreign universities. Universities in the central and western regions and the northeastern region are more dependent on external international resources. However, their local student economic capacity, urban attractiveness, internationalization of teaching staff and relatively underdeveloped industries put them in a disadvantageous position of high dependence and low attractiveness in the collaborative relationship with foreign universities. In the long term, the eastern region may transform its original resource advantages into the continuous aggregation of CFCRS programs and institutions by constantly strengthening its hub position in the global higher education network, while the central and western regions and the northeastern region will be trapped in a vicious circle where both resources and cooperation opportunities are scarce.

6. Conclusions

Based on a systematic analysis of the official statistics released by the Information Platform for Supervision of CFCRS, we believe that the current landscape of TNHE in China is characterized by several structural imbalances as challenges or problems. These include an imbalanced distribution of program levels, a skewed distribution of academic disciplines, asymmetry in the selection of partner countries and institutional quality, and significant

regional disparities in their geographical layout. Drawing on RDT, we provide an in-depth analysis of the underlying reasons for these challenges and problems. These imbalances are essentially the result of rational choices made by the cooperating parties under specific institutional and environmental constraints in order to obtain key resources for survival and development, and are the product of the combined action of the logic of resource exchange and the power structure.

Albeit the context of this research is confined to the Chinese context, it has certain implications for TNHE worldwide. First, when developing TNHE, all countries should shift from merely pursuing scale expansion to concentrating more on structural optimization and quality improvement. Second, resource dependence and power asymmetry should be appropriately handled and both parties of the cooperation should avoid turning TNHE into a tool for "student recruitment and revenue generation". Third, the subjects and partner universities can and should be diversified rather than solely focusing on certain "popular majors" and a few English-speaking countries. Fourth, TNHE policy needs to be designed in a coordinated manner with national and regional development strategies to prevent the aggravation of the imbalance in higher education among regions. Finally, while teaching and learning should be valued, TNHE should also pursue high-level cooperation model that emphasizes scientific research collaboration and knowledge co-construction.

This research mainly relies on macro quantitative data for analysis. Although it can clearly reveal the overall structural problems, it is difficult to explore the complex dynamics and specific challenges at the micro level (such as classroom teaching, student experience, and teacher development). Future research can adopt qualitative methods, supplementing and verifying the macroscopic findings of this study through qualitative methods such as in-depth interviews and observations.

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The Role of Emotional Intelligence in Fostering Collaborative Learning in Algerian EFL Higher Education

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Abstract

The present paper investigates the relationship between emotional intelligence (EI) and collaborative learning (CL) among first-year English students at Khenchela University, Algeria. It combined survey data from 39 students and a group work assessment with interviews of five EFL university professors. The Schutte Self-Report Emotional Intelligence Test (SSEIT) and the Collaborative Learning Survey (CLS) were used. Pearson's correlation analysis revealed a strong positive relationship between EI and CL (*r* = 0.885, *p* < 0.001), with EI accounting for 78% of the variance in CL performance. This suggests that students with higher EI levels tend to excel in collaborative tasks. Teacher interviews; however, revealed several implementation challenges, including inconsistent EI assessment methods, students' struggle with frustration and introversion during teamwork, and the lack of standardized protocols for evaluating emotional competencies.

Keywords:
Algerian higher education, collaborative learning, EFL students, emotional intelligence

1. Introduction

Cognitive skills play a role in classroom performance, yet academic success requires more than mere intelligence. Emotional intelligence (EI) has emerged as a key factor in shaping collaborative learning outcomes and particularly in EFL environments.

Although intellectual abilities contribute to learning, they do not guarantee academic achievement, personal growth, and enduring job satisfaction.

Emotional intelligence (EI) encompasses the ability to perceive one's own emotions and those of others. It can be characterized as having abilities such as being able to motivate oneself and persist in the face of frustrations; to control impulse and delay gratification; to regulate one's moods and keep distress from swamping the ability to think; to empathize and to hope (Goleman, 1995). These competencies are not just psychological virtues; they are essential to effective collaborative learning.

While families contribute to emotional development, their influence is often indirect and counterproductive. Schools, particularly in EFL contexts where collaborative tasks are essential to language acquisition, now bear a dual responsibility as they ought to teach language skills and support the emotional development that make collaboration possible.

This need is especially important in EFL programs of Algerian universities, where collaborative learning is emphasized but often faces several emotional challenges.

Students may participate in group discussions, peer reviews, and project-based activities; however, they struggle with shyness, frustration, and above all a difficulty in expressing emotions. As a matter of fact, these barriers undermine collaboration among students. Consequently, this study aims to examine the relationship between EI and CL, and to assess the baseline levels of both competencies among first-year EFL students at the University of Khenchela, Algeria.

This research is significant because it addresses the critical role of emotional intelligence in collaborative learning outcomes of first-year EFL students. By investigating how students' EI levels influence their collaborative learning skills and build trust in group settings, the findings will empower educators to design targeted interventions that encourage emotionally intelligent learners.

The study is guided by the following research questions:

- What is the emotional intelligence (EI) level of first-year EFL students at Khenchela University?
- What is the collaborative learning (CL) level of these students?

- Is there any significant relationship between EI and CL?

2. Literature Review

2.1. Emotional Intelligence

Emotional intelligence (EI) is the process involved in the recognition, use, understanding, and management of one's own and others' emotional states to solve emotional problems and regulate behavior (Salovey et al., 2007).

Mayer et al. (2004) define EI as "the ability to perceive and express emotion, assimilate emotion in thought, understand and reason with emotion, and regulate emotion in the self and others" (p. 200). They claimed that individuals' emotions and feelings impact their thinking, the subjects they ponder, and their behaviors.

Leuner (1966) was the first to record EI's potential for personal development. His work was later expanded by Beasley (1987) and Payne (1986), who further developed EI's theoretical and practical framework.

Academicians in the 1980s integrated different types of intelligence through the models proposed by Gardner (1983) and Sternberg (1985). The link between emotions and cognition became stronger during this period. This resulted in the development of foundational EI frameworks by Salovey and Mayer (1990). The concept of EI gained widespread attention with the release of Goleman's bestselling book *Emotional Intelligence* in 1995.

Parker et al. (2004) associated EI with educational outcomes, including students' ability to adapt in group settings and teachers' success in creating inclusive classrooms. Nonetheless, the field of EI has face criticism for cultural biases in emotion recognition tasks and the necessity for EI training to develop 21st-century competencies such as digital literacy (Matthews et al., 2002).

2.2. Collaborative Learning

Collaborative learning (CL) emerged as a key educational approach for developing the teamwork skills needed in today's world. It is a pedagogical approach where learning groups work collectively to solve problems, complete a task, or create a project (Brody & Davidson, 1998).

Johnson (2009) identifies three relational dynamics in collaborative settings: learners may promote each other's success, hinder it, or operate independently. Effective collaborative learning leverages the first dynamic, fostering interdependence through tasks that demand collective reasoning and accountability.

According to Taggart and Wheeler (2023) collaborative learning is primarily associated with constructivism, where learners create their own knowledge. It is also connected to social learning theory through the interaction within a team and is more age-appropriate for college students. CL involves the activities and the process of sharing ideas and experiences between students. Indeed, students learn better when they are in groups where they try new ways of learning with their peers. In addition, CL can reduce absenteeism because students feel a responsibility to the group.

However, the rise of digital learning environments introduces new considerations. Akinoso (2024) notes that "virtual learning may limit students' opportunities for social interaction and the development of social skills. […] The absence of these social interactions can impact students' social-emotional development and ability to work effectively in teams" (p. 41). This highlights a critical challenge in achieving the social benefits of CL in fully online settings.

2.3. The Impact of Emotional Intelligence on Collaborative Learning

Several studies have showed that emotional intelligence facilitates effective collaborative learning across different educational settings. Recent academic works indicate that EI enhances students' ability to work in teams, manage conflicts, and build stronger peer relationships.

Fuertes-Meza et al. (2025) examined EI's influence on high school students' collaborative work. They found that skills like emotional awareness, self-control, and social awareness improve cooperative learning outcomes. Their theoretical analysis suggested that integrating EI into the classroom helps students manage both schoolwork and social situations more effectively.

Shafiq et al. (2025) carried out a study with 605 secondary students. They revealed a positive correlation between socio-emotional intelligence and collaboration. Learners with higher EI showed improved teamwork skills and enhanced academic results. The authors highlighted the need to integrate EI in the development of educational curricula.

The importance of EI extends to higher education as well, as shown by Siahaan et al. (2024) who

demonstrated how EI and collaboration skills enhance job satisfaction and performance among university lecturers. Their research identified collaboration ability as the strongest predictor of professional efficiency. They asserted that educators with high levels of EI are better equipped to manage group work and foster productive learning environments.

Finally, Rostampour and Niroomand's (2023) study explored EI's impact on language learning. The authors identified adaptability as a key component of EI and argued that it is the strongest predictor of listening comprehension performance in EFL learners.

The above studies establish emotional intelligence as a fundamental factor in successful collaborative learning across different educational levels and contexts. However, further research is needed in specific contexts. In particular, little is known about how this relationship works among EFL students in Algerian universities, where cultural and teaching practices may shape students' collaboration.

3. Research methodology

3.1. Population and Sample

The present study was conducted with 39 first-year EFL students at the University of Khenchela, Algeria, (N = 39). We picked the sample of random 39 students from two groups to represent the population. They completed both the emotional intelligence (EI) and the collaborative learning (CL) questionnaires.

3.2. Research Design

The study relied on a mixed-methods convergent parallel design to investigate the relationship between Emotional Intelligence (EI) and Collaborative Learning (CL) skills among first-year EFL students at Khenchela University. We hypothesized that there is a significant relationship between EI and CL by using a correlational design.

3.3. Research Instruments

The study used three tools to gather data:

- Schutte Self-Report Emotional Intelligence Test (SSEIT),
- Collaborative Learning Survey (CLS),
- and semi-structured interviews with five permanent professors at the English Department of Khenchela University.

3.4. Data Analysis

The quantitative data were analyzed using the Statistical Package for Social Sciences (SPSS). The qualitative interview data were transcribed and analyzed thematically using Nvivo.

Responses of the survey were recorded on Likert scales (e.g., Strongly Disagree to Strongly Agree) and open-ended questions. To ensure internal consistency, a reliability analysis was conducted, yielding a Cronbach's alpha of 0.865 (Table 2) and indicating excellent reliability. All items demonstrated strong correlations with the total score (Table 2), confirming their contribution to the scale's consistency.

The collaborative learning scale (10 items) had a mean score of 34.93 (SD = 7.36), with item means ranging from 30.79 to 32.14. Internal consistency for the scale was good (Cronbach's α = .845). Corrected item-total correlations ranged from .167 to .862, indicating that most items contributed adequately to the scale reliability. Items with the lowest contribution were "Prefer leadership role" (r = .167), whereas items like "CL helped work effectively in groups" showed the highest contribution (r = .862). The Full item-level statistics are available in Appendix A.

4. Results

4.1. Descriptive Statistics

Descriptive statistics indicated that participants demonstrated generally high levels of both emotional intelligence (EI) and collaborative learning (CL). EI scores ranged from 114 to 159 (M = 141.66, SD = 12.02). CL scores ranged from 20 to 53 (M = 36.93, SD = 10.30).

Table 1

Descriptive Statistics for EI and CL

	N	Min.	Max.	Mean	Std. Deviation
EI_total	39	114.00	159.00	141.66	12.02
CL_total	39	20.00	53.00	36.93	10.30

Reliability analysis confirmed excellent internal consistency for the collaborative learning scale (Cronbach's α = .865).

Table 2

Reliability Statistics for Collaborative Learning Scale

Cronbach's Alpha	N of Items
.865	10

4.2 Relationship between Emotional Intelligence and Collaborative Learning

A Pearson correlation analysis revealed a statistically significant, very strong positive relationship between emotional intelligence (EI) and collaborative learning (CL) scores, $r = .885$, $p < .001$. This suggests that students with higher EI tend to perform significantly better in collaborative settings, with EI explaining approximately 78% of the variance in CL outcomes. These findings underscore the potential value of integrating EI training into pedagogical strategies to enhance group-based learning.

Table 3

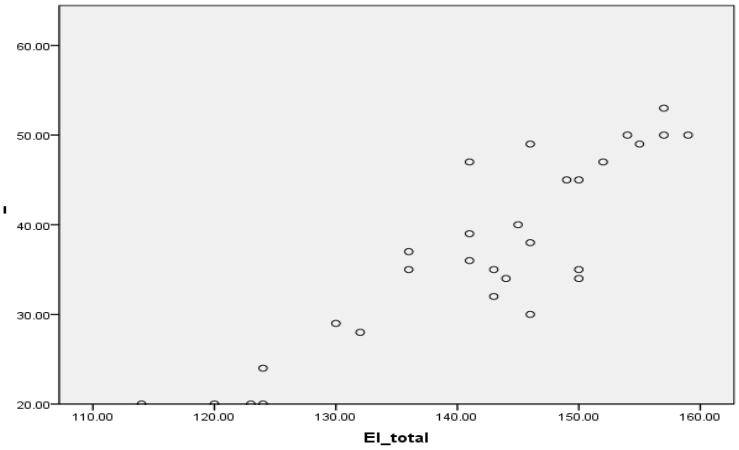
Pearson Correlation between EI and CL

Variable	EI	CL
EI	1	.885**
CL	.855**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Figure 1

Scatter plot illustrating the strong positive linear relationship between emotional intelligence and collaborative learning scores.



4.3. Qualitative Findings: Analysis of Teachers' Interviews

Reflexive thematic analysis of semi-structured interviews generated five themes as shown in Table 4.

After generating the initial codes, the researchers named and defined the themes as shown in Table 5.

Table 4

Themes, Sub-themes, and Codes (Nvivo)

General Themes	Sub-Themes	Basic themes (Codes)			
1.Teacher Perceptions of EI	a. familiarity with EI	**Q:** Are you familiar with the concept of Emotional Intelligence (EI)? **"T1, T2, T3, T4, T5":** Yes			
	b. Teachers' definitions of EI	**T1:** The innate feel of socializing and skill in mingling with different categories of people's personalities. **T2:** It is the ability to control your own emotions and understand those of others **T3:** Skills to interpret our and others' emotions **T4:** It is the ability to recognize, understand, manage, and influence one's own emotions and the emotions of others **T5:** the capacity of being aware of your emotions as a tool that might help in your EFL learning process			
	c. Key Indicators of EI	Use of emotions for learning Self-awareness and self-regulation (T2, T4) Empathy and social skills (T2, T4, T5)			
	d. Variability in EI Assessment	Poor EI	Moderate EI	Indecision in assessment	height EI
	e. Challenges in Observing EI	T1: Cannot decide, hard to assess T5: Yes but not in a scientific way there is No protocol to follow while observing EI			
2. Collaborative Learning (CL) Competence and Challenges	a. Mixed CL Skill Levels	**Strengths:** 1. Teamwork enthusiasm 2. High collaboration 3. comfort zone		**Weaknesses:** 1. Low motivation 2. agreement challenges 3. participation gaps	
	b. Group Work Obstacles	Miscommunication (T3). Introversion, shyness (T5). Diverse learning styles (T1)			
3. EI-CL Interrelationship	a. Positive EI-CL Correlation	Self-confidence boosting participation Empathy enhancing group cohesion Communication skills aiding collaboration			
	b. Low EI Hindering CL	Poor conflict resolution Frustration during tasks Emotional withdrawal			
EI Development and Pedagogical	a. Teacher Beliefs in EI's Role	Interaction facilitation EI training benefits			

Practices	b. Limited EI Integration in Teaching	No structured approach (T1, T3, T4). Discussion-based activities (T2). Ad-hoc methods
5. Contextual and Cultural Factors	No Reported Cultural Influences	Unobserved gender dynamics (T1, T2) No language barriers noted (T3, T4, T5)

Table 5

Themes and their Description

Theme	Description
Teacher Perceptions of EI	This theme captures teachers' understanding of EI and their evaluations of students' EI levels. It includes teachers' definitions of EI (e.g., self-awareness, empathy, emotion regulation) and their observations of variability in students' EI, ranging from "high" to "very poor." Sub-themes highlight assessment inconsistencies and key EI indicators like social skills and emotional awareness.
Collaborative Learning (CL) Competence and Challenges	This theme centers on educators' assessments of students' abilities to collaborate, highlighting both strengths and weaknesses It also points out situational obstacles in group activities, such as shyness or differing learning preferences, that impede successful collaboration.
EI-CL Interrelationship	This theme investigates the perceived relationship between emotional intelligence (EI) and collaborative learning (CL). Educators observed that elevated EI traits (such as empathy and self-assurance) promote teamwork by improving communication and fostering group unity, which is in line with the quantitative data showing a positive correlation. In contrast, traits associated with low EI (like frustration and introversion) were associated with difficulties in CL, such as ineffective conflict resolution.
EI Development and Pedagogical Practices	This theme addresses teachers' beliefs about EI's role in improving CL and their current practices. While most acknowledged EI's importance, few reported structured activities to develop it. Sub-themes contrast ad-hoc methods (e.g., discussions) with the lack of formal protocols, suggesting a gap in systematic EI integration.
Contextual and Cultural Factors	This theme examines whether cultural or institutional factors at Khenchela University influence EI or CL. Teachers unanimously reported no observable cultural barriers (e.g., gender dynamics, language issues), positioning EI and CL as universal skills unaffected by local context in their view.

Theme 1: Teacher Perceptions of Emotional Intelligence (EI)

All teachers unanimously affirmed familiarity with EI (T1–T5: "Yes"), and definitions broadly aligned with core components (e.g., T2: "control your own emotions and understand others"; T4: "recognize, manage, and influence emotions"). However, assessments of student EI levels diverged markedly: T3 perceived students as having "high" skills to interpret emotions, while T2 and T4 described "moderate" competence. In contrast, T5 critiqued students' "very poor" emotional awareness, and T1 expressed uncertainty ("Cannot decide, hard to assess!"). The resultant theme—Teacher Perceptions of EI—underscored a tension between theoretical awareness and inconsistent praxis.

Theme 2: Collaborative Learning (CL) Competence and Challenges

Building on the variability in EI assessments identified in Theme 1, thematic analysis uncovered polarized CL competencies among students, with strengths and weaknesses directly tied to observable EI traits. Teachers unanimously acknowledged students' enthusiasm for collaboration (T1: "love teamwork"; T4: "high collaborative skills"), with T4 explicitly linking this strength to EI-derived traits like "self-confidence and social skills." Conversely, significant challenges were attributed to low EI indicators: T3 reported "low collaborative learning" due to "miscommunication and no motivation," while T5 attributed group work struggles to students' "introversion and shyness." For instance, T4's students—described as having "high social skills" (a high-EI trait)—aligned with stronger CL outcomes, whereas T5's critique of "shyness" (low EI) mirrored quantitative results showing weaker collaboration in low-EI cohorts. The interplay between EI variability and CL outcomes underscored the need to examine

specific EI components shaping collaboration, a gap addressed in Theme 3.

Theme 3: EI-CL Interrelationship

Thematic analysis culminated in a robust narrative confirming the interdependence of EI and CL. Iterative coding of teacher interviews delineated two subthemes: EI as a facilitator of collaboration and low EI as a barrier. Teachers overwhelmingly (4/5) identified high EI as critical to CL success, exemplified by T2's observation of empathy-driven cohesion ("Students stand by each other… defend classmates based on trust") and T4's emphasis on self-regulation ("high self-confidence in responding to questions"). Conversely, low EI was directly linked to CL breakdowns: T1 noted frequent "frustration" disrupting group work, while T5 highlighted students' reactive (vs. proactive) emotional management ("used EI to de-stress before exams but lacked [skills] during collaboration"). The triangulation of qualitative and quantitative data conclusively validated the hypothesis, demonstrating that EI's presence amplifies collaborative efficacy, while its absence exacerbates conflict.

Theme 4: EI Development and Pedagogical Practices

Thematic analysis concluded with a critical tension between teachers' recognition of EI's pedagogical value and the absence of systematic implementation. Despite consensus on EI's importance (T4: "Improving EI facilitates interaction"; T5: "Training students to control emotions would benefit collaborative skills"), coding revealed stark disparities in classroom practices. Three teachers admitted to ad-hoc or nonexistent EI cultivation: T1 stated they "never incorporated EI activities", T3 outright rejected EI exercises ("No"), and T5 lamented the lack of "protocol to follow while observing EI." This systemic neglect, embodied in T5's "no protocol" critique, explains why even high-EI students (Theme 3) lacked proactive emotional management during collaboration. By exposing this pedagogical-practical divide, the analysis underscores the urgency of research into culturally and contextually responsive EI frameworks.

Theme 5: Contextual and Cultural Factors

Thematic analysis concluded with a critical exploration of sociocultural influences. Following reflexive coding of teacher interviews, no evidence emerged to suggest cultural, linguistic, or gender-based factors impacted students' EI development or collaborative outcomes. All teachers unanimously dismissed contextual influences: T1 stated they "have not observed cultural factors," while T2–T5 categorically rejected gender or language barriers ("No"). T4's earlier emphasis on "self-confidence" (Theme 3) as a CL driver and T5's critique of "no protocol" (Theme 4) were interpreted as universal pedagogical challenges, not culture-bound phenomena. While this finding does not negate the need for culturally adaptive EI frameworks in future research, it defends the study's internal validity, insulating its conclusions against critiques of contextual bias.

5. Discussions

The results showed that EI and CL have a significant positive correlation, which confirms a strong, significant EI-CL relationship (*r* = 0.885), supporting Goleman's assertion that EI enhances collaboration. While teachers' observations of empathy-driven cohesion (T2) and self-regulated participation (T4) align with Mayer and Salovey's ability model, which prioritizes emotion regulation in social contexts. The correlation's strength surpasses prior studies such as Parker et al study (2004), likely due to the research context.

The quantitative analysis revealed a strong positive correlation between emotional intelligence (EI) and collaborative learning (CL) (*r* = 0.885, *p* < 0.001), with EI explaining 78% of CL variance. This statistical relationship was contextualized by qualitative themes, which interpret why and how EI shapes CL. For instance, while teachers universally recognized EI's importance (Theme 1), their inconsistent assessments of students' EI levels (e.g., T1's uncertainty, T5's critique of "no protocol") mirrored the moderate variability in EI scores (Mean = 141.66). This inconsistency underscores systemic gaps in evaluating EI, which likely constrained the correlation's strength.

Qualitative findings further clarified the mechanisms behind the EI-CL link. Teachers attributed strong CL outcomes to high-EI traits like empathy (T2: "students defend classmates based on trust") and self-regulation (T4: "high self-confidence in responding to questions"), directly aligning with the quantitative model's prediction. In contrast, low EI indicators, such as frustration (T1) and introversion (T5), were linked to CL breakdowns, explaining why students with poor emotional regulation scored lower in collaborative tasks.

Thematic analysis also highlighted pedagogical gaps. Despite valuing EI, teachers lacked structured methods to cultivate it (Theme 4). This disconnection between theory and practice suggests that institutional support for EI training could amplify the observed correlation. Finally, the absence of cultural influences (Theme 5) reinforces the intrinsic nature of the EI-CL relationship, insulating findings from critiques of contextual bias. This may occur because the ability to recognize and control one's emotions helps in using them effectively during exams.

6. Conclusions

The present research aimed to investigate the relationship between students' emotional intelligence and their collaborative learning. Its primary focus was finding a significant association between the two variables.

The findings show that there is a significant positive relationship between students' emotional intelligence (EI) and their collaborative learning (CL) capabilities.

The EFL professors acknowledged EI as an essential element in shaping how the groups of students work together. They observed that students with higher EI demonstrated great empathy, communicated more effectively, and resolved conflicts during teamwork.

Nonetheless, evaluations of students' EI were irregular because of the lack of standardized evaluation instruments. This resulted in fragmented perceptions of EI levels that varied from "high" EI to "very poor." Issues like frustration, miscommunication, and introversion were associated with low EI, whereas self-confidence and social abilities became necessary for effective and successful collaboration.

Based on the current findings, the researchers suggest four main recommendations:

- Create EI evaluation models based on evidence,
- Integrate EI training for both students and educators,
- Apply strategies to improve emotional awareness during classroom interactions, and
- Conduct long-term studies by researchers to assess EI's impact on academic outcomes.

The study's generalizability is one of the significant limitations that the researchers have encountered. The sample drawn is from an extremely specific demographic, which is first year EFL students and teachers of a single department, of a single university and a particular region, which makes the findings not applicable to other contexts. As educational environments vary in terms of resources, student population and curricular design, results from one context may not necessarily represent other contexts.

This study opens several paths for further research to deepen the understanding of EI and enhance the integration of it in language education. Future research should consider highlighting other various proficiency levels other than first year EFL students. This would help in the understanding on how emotional intelligence can be used to enhance students' collaborative learning and all the four skills.

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Appendix A

Item-Total Statistics

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Overall positive experience	31.36	43.646	.662	.845
Ease of agreeing on meeting time	31.29	43.989	.641	.847
Ease of agreeing on meeting location	31.32	45.263	.462	.863
Group effectiveness	32.14	47.386	.665	.852
Enjoy working collaboratively	31.50	43.444	.487	.863
CL helped understand course materials	31.46	45.295	.513	.858
Prefer courses with collaborative learning	31.57	40.550	.801	.832
Get along with team members	31.86	38.720	.803	.830
Prefer leadership role	31.07	50.735	.167	.882
CL helped work effectively in groups	30.79	46.101	.862	.843

Appendix B

Semi-Structured Interview Protocol for Teachers

Appendix B presents the semi-structured interview questions used to explore five teachers' perceptions of emotional intelligence (EI), collaborative learning (CL), and the relationship between the two constructs among first-year EFL students at Khenchela University, Algeria.

1. Conceptual Understanding of EI

Are you familiar with the concept of Emotional Intelligence (EI)? How would you define it in your own words?

2. Observation and Assessment of EI

Do you observe or assess students' emotional intelligence during classroom or group activities? What specific behaviors or indicators help you identify students' EI levels?

3. Students' EI Levels

How would you describe the overall level of emotional intelligence among your first-year EFL students (e.g., high, moderate, low)? Can you provide examples of behaviors that reflect high or low EI in your classroom?

4. Collaborative Learning Skills

How would you describe your students' collaborative learning skills during group work? What strengths and weaknesses have you observed?

5. Challenges in Collaborative Learning

What challenges do students commonly face during collaborative learning tasks (e.g., communication difficulties, unequal participation, conflict)?

6. Relationship between EI and CL

In your experience, does emotional intelligence influence students' performance or participation in collaborative learning? Can you share an example where EI either facilitated or hindered group work?

7. Pedagogical Practices Related to EI

Do you incorporate activities aimed at developing students' emotional intelligence in your teaching practices? Why or why not? How do you encourage students to use EI-related skills (e.g., empathy, emotional regulation) during group work?

8. Contextual and Cultural Factors

Are there any institutional, cultural, gender, or language-related factors at Khenchela University that you believe influence students' emotional intelligence or collaborative learning?

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Theoretical article

Challenges and Opportunities in Applying Cost-Benefit Analysis to Adult Education Budgeting in Nigeria

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Abstract

This paper seeks at identifying the prospects and the issues related to the use of Cost-Benefit Analysis (CBA) in adult education budgeting in Nigeria. The research objectives examine how poor funding affects adult education initiatives, to review the organisational and functional difficulties which the providers encounter, and to explore possibilities of adopting CBA for funding and policy planning. This study made use of literature-based approach where secondary data from literature was used to reconsider general concerns relating to adult education in Nigeria. This research reveals the following constraints associated with the use of CBA: The data are often inaccurate; there is a skilled workforce shortage; politics and bureaucracy hinder the process; and the method is ineffective in enabling the assessment of long-term impacts. For that reason, enrolment, costs of specific programs, and their results remain obscure, undermining cost-benefit analysis. Consequently, the study underscores practices and measures that can help address these challenges, including strengthening data collection mechanisms, promoting capacity development, breaking political and cultural barriers to evidence-based policy development. The first area for the integration of CBA into the budgeting of adult education is the idea of a potential better match between resource inputs and needs, which can be improved through application of relevant technologies such as big data and GIS. Hence, engagement of the international organizations and NGOs can also offer technical assistance and capacity development programmes. CBA can also be used positively to argue for higher funding for adult education. This study recommends the enhancement of strategic partnership, data enhancement, push for policy changes to enhance the use of CBA in adult education in Nigeria.

Keywords:
cost-benefit analysis, challenges, opportunities, adult education, budgeting

1. Introduction

Adult education is therefore very crucial in correcting the literacy rate in Nigeria and thus improve the economy as well as providing her citizens the basic nature of lifelong learning. It embraces a spectrum of programmes that offered to facilitate the degree adult with basic skills to enable him or her to retrieve decent livelihood and reintegrate in to the socioeconomic system through literacy, vocational education/training, and education. National Commission for Mass Literacy Adult and Non Formal Education(NMEC) has therefore provided structures at the national level to promote the learning of adults. Despite these initiatives, the sector is plagued with challenges like lack of funding, poor physical accomodation and lack of qualified workforce. These challenges therefore limit the expansion and improvement of adult education thereby confining a rather large segment of the adult learning deficitropriate technologies and skills for meaningful contributions to the developmental process of their respective countries, but especially in the rural areas.

Attempts to tackle such barrier have had little success general, multiple factors being that adult education does not have much cultural importance in many societies and gender inequalities means more women are excluded than men. In addition, most adult education programmes in Nigeria are underfunded, where funding is generally below 1% of the funding available for education. Such charaterisation of the financial sector, combined with institutionalisation hampers the viability and growth of such programs. However, one cannot deny the importance of the potential of adult education towards creating socio-economical change in Nigeria. To optimise this potential, policy measures for resource allocations have to be systematically constructed, stable funding sources have to be developed, and public private partnership has to be encouraged. By so doing, Nigeria can build an efficient and effective adult education

sector that will effectively meet the literacy and skill demands of the country.

Objectives of the Study

1. To assess the impact of inadequate funding on the effectiveness and sustainability of adult education programmes in Nigeria.
2. To evaluate the structural and operational challenges faced by adult education providers in Nigeria, with a focus on infrastructure, teacher training, and programme delivery.
3. To investigate the opportunities for integrating cost-benefit analysis (CBA) in the budgeting and policymaking processes for adult education in Nigeria.
4. To explore the role of partnerships with international organisations and NGOs in strengthening the application of CBA to adult education policymaking in Nigeria.

2. Methodology

The current research used secondary research and collected data from scholarly articles from various databases including Google scholar, Jstor, and pubmed among others. This research mainly concentrated on compiling articles, reports, and publications that discuss the difficulties, financing, and policies of educating Nigerian adults. This study therefore sought to systematically review and synthesise available literature so as to construct the extant picture of the state of adult education in the country to inform on the factors that impacts its efficiency and consideration for long term paradigms. This approach allowed for the review of numerous confirmations and affirmations of the different theoretical and methodological approaches stemming from previous similar researches and paved the way for the presentation of the research findings without the need to gather primary evidence.

Overview of Cost-Benefit Analysis (CBA) in Education

Cost-Benefit Analysis (CBA) is a method applied to compare the overall cost differentials faced in a business between two choices or different policies. In the context of education CBA refer to process of establishing the value of the inputs that are needed in running the educational programs in terms of the results produced in terms of literacy employment and economic productivity. Fundamentally, the purpose of CBA is to provide a policy relevant answer to the question of whether the returns from a given investment in education are greater than the costs involved. This approach is based on several major postulates, such as the inclusion of all benefits and costs, quantification of non-retail advantages, and discounting of the costs and benefits. These include cost-benefit analysis that involves comparison of different interventions with similar goals, assessment of the worth of educational programmes through a net present value formula (Levin & McEwan, 2020).

CBA has a critical function in education budgeting and decision making provides the systematic information through which the resource allocation can be made. Education systems are always under pressure to allocate scarce resources to necessary initiatives meaning that priority needs to be placed on interventions that will most likely reap the most benefits. In its approach to measuring the costs and benefits of policies CBA produces objective benefits such as greater earnings, higher productivity, and active employment cost savings as a result of unemployment. For instance, developing and strengthening of early childhood education has been found to result into great long-term economic returns such as advanced learning capabilities and the ability to earn good incomes when an individual grows up (Heckman et al., 2010). Likewise, programmes that aim to improve adult literacy also has positive benefits socially such as improving the numbers of workforce participation and decreasing the dependency ratio, which are reasons why such programmes should be in any country's budget (Hanushek & Woessmann, 2020).

In the global world, several successful applications of CBA in education show that the method has its significance. In the United States, the Perry Preschool Project is a widely cited example, where an investment in high-quality preschool education for disadvantaged children resulted in a benefit-cost ratio of approximately 7:1. Program outcomes were improvements in high school completion rates, lower rates of incarceration and improved lifetime earnings (Heckman, Pinto, & Stearns, 2010). For instance, Bangladesh's Female Secondary School Assistance Programme relied on CBA to perfectly justify the subsidies on education for girl child. The programme provided evidence of economic rationality by increasing concomitant education gender parity and raising relative economic growth (Asadullah & Chaudhury, 2009). Likewise, in sub Saharan Africa, CBA have been used to assess vocational training

projects that indicate positive costs in terms of employment opportunities and quality of live or poverty reduction (Hicks et al., 2016).

The use of CBA in education makes a point about the importance of evidence in decision making. Due to the emphasis on the economic and social returns flowing from educational investments, it provides a sound framework for targeting programmes that have significant effects in the long run. Yet CBA implementation demands accurate, technically-sound data, not to mention context-specific information, notably when it comes to the reality of the developing world. These elements are fundamental to optimise the potential of CBA and to prevent assiduous educational resources from being spent on ineffective and social-benefit marginal projects.

3. Results

3.1. The State of Adult Education in Nigeria

The study is important to fill the gaps in literacies, poverty, and national development as an avenue in Nigeria. It covers both, formal, non formal and informal education processes for the qualitative growth and socio economic re-orientation of adults. Currently, the programmes that are offered in the Nigerian adult education includes; literacy education, vocational studies, SRFE and LL. These programmes usually available and implemented through adult literacy centers, community educative programs, and other states' supported bodies such as the National Commission for Mass Literacy, Adult and Non-Formal Education (NMEC). However, these efforts have not placed the African region and Nigeria in particular on a vantage point to over come the challenges that have enshrouded the delivery of adult education.

Therefore, funding pattern for adult education in Nigeria has always been poor and has received minimal provisions out of the total national and state budgets. In this area we find that adult education is closely associated with formal basic and tertiary education to which policy makers pay more attention. From the above data obtained from the Federal Ministry of Education, adult and non-formal education receive only about 1% of the country's education budget every year (Okebukola, 2021). This financial abandonment is a major setback to the sustainability of adult education programmes, the capacities of adult education providers in delivering quality instructions and quality resources is hampered. Besides, the major source of support for adult education is from international funding agencies and Non-governmental organisations, which are unpredictable and often short-term (Olaleye et al., 2022). This paper examines how a weak funding system impedes the growth of adult literacy education programs and limits is ability to meet necessary demand.

The Nigerian adult education is also faced structural and operational difficulties. It still has a high adult illiteracy rate whereby 31% of all the adults are illiterate, according to UNESCO (2023). This disappointing fact speaks volumes of the general development of education for adults; there is rarely any infrastructure, and the people preparing these programs are often ill-equipped. Most centres are ill equipped with few facility provisions like proper class, learning resources and better education aids for the adults. However, there are few qualified teachers trained to teach adults using adult education approaches. This challenge is worsened by poor remuneration of instructors which leads to poor retention of qualified staff (Adeyemi et al., 2023).

The cultural beliefs also negatively affect the fortunes of adult education in Nigeria. Most grown up persons especially from the countryside consider education the preserve of the young and children, this hampers enrolment and high dropout rates in adult education. Further, the Covid-19 closed schools and education challenged by gender disparities particularly, women and girls encounter more constraints in their access to education, coming with socio-cultural expectations of care giving and domestic chores (Amadi et al., 2021). To address the above challenges there is need for right policies through policy formulation, enhancement of funding and collaboration to foster effective environment to support the adult learners.

Therefore, even though adult education in Nigeria has large possibilities for contributing towards national development and personal development, its status quo remains disturbingly troubling. Funds, infrastructures and capacity development for skilled manpower are mainframe areas that need to be address to foster this sector. Without these interventions the country continues to wallow in high illiteracy levels and restrict chances of most adults to meaningfully contribute to socio-economic development..

3.2. Challenges in Applying CBA to Adult Education in Nigeria

One major factor is a limited number of published case in the public domain and the difficulty in

obtaining the data set. One major player when it comes to CBA is data, proper and authentic data and unfortunately, the adult education sector in Nigeria is deprived of such data. This has led to restricted information on enrolment rates, costs of the programme as well as the impacts on clients after the programme indicating a poor ground for coherent economic assessments. Olatunji et al. (2022) point out that variability in data collection strategies and low development of IT resources in schools and colleges deepens this problem. This implies that decisions based on assumption are not only unreliable but also fall short of delivering accurate cost and benefit estimates that could be taken to task by the CBA results.

Besides the two concerns highlighted concerning data requirements, there is limited human capital in Nigeria for applying CBA methodologies. Due to these reasons, CBA needs people with experience in estimating benefits of an economic or social nature in relation to the cost or otherwise. Nevertheless, there is a challenge of professionals in the carriage of adult education budgeting who have no training on how to undertake efficient CBAs. A study by Ajayi & Aluko (2021) revealed that there is a slight room for policymakers and education administrators to use sophisticated economic tools which they end up making decisions based on perceived opinions. This deficit of expertise is aggravated by a lack of adequate support for capacity-building programs in education economists or analysts.

Hindrances originating from political and bureaucracy also present real challenge when applying evidence based budgeting in adult education. Policy formulation and implementation processes in Nigeria are usually dictated by the politics than research results hence wastage of resources. Lack of responsiveness of legal structures leading to bureaucracy and late disbursement of funds and lack of integration of ministries also hamper the implementation of CBA in adult education. As pointed out by Emeh et al. (2023), these systemic problems hinder the application of the CAB findings in the budget cycle, hence making any attempt to enhance the funding of adult education less productive.

Concerning the application of CBA, there is also a variety of cultural perceptions relating to adult education. It is unfortunate that adult education has been considered in many regions in Nigeria especially as a junior to formal education; thus, the worth of adult education is not given much significance by the society. This perception makes it difficult to both measure and defend investments in adult education based on the CBA because measures like self-esteem or increased vote turnout will not command a price tag. Edeh (2020) says that these cultural biases lead to the exclusion of adult education from policy and budgetary imagination even though it holds promising, demographic dividends for the socio-economic growth of any given country.

However, the major challenge of bringing about CBA in adult education is for long term outcome of adult education to be measured. Unfortunately, these personal benefits such as productivity gains, improved health or positive benefits for future generations are not easy to measure. This limitation impacts on the captivity of CBA and normally translates into under estimating adult education programmes. As pointed out by Nwogu and Bello (2021), there is a dearth of follow-up research that would show participants' experiences at different phases or stages of the intervention.

Therefore, the use of CBA to adult education in Nigeria is bound to face a lot of challenges; these include; Shortage of data, Lack of technical skills, political and bureaucratic bottlenecks, Cultural beliefs and perceptions, and lastly the challenge of measuring long-term results. Overcoming these barriers will require conscious commitment to develop data infrastructure, human and financial resources in adult education in the national policies and budgetary processes.

3.3. Opportunities for Integrating CBA in Adult Education Budgeting

An analysis of Cost-Benefit Analysis (CBA) reveals a lot of prospect to enhance the resource allocation within the field of adult education in Nigeria especially by means of the evaluation of budgets. Whereas it is common for adult education to struggle for subsectors in an early-stage economy in which funding is scarce, CBA offers a method of determining the economic profitability of investment. This way, the costs incurred in the adult education programmes are measured against the potential returns or benefits; policymakers work with the best option that gives them high returns. For instance, research has postulated that adult education results in better employment opportunity, better income standards, and better health of people, all of which enrich national economic growth (UNESCO, 2022). CBA uses available data to distribute resources to programmes

that will make the most significant difference hence increasing strategic resource allocation in the budgeting process (Psacharopoulos & Patrinos, 2018).

The use of technology and data analysis in the computation of CBA also adds high flexibility and possibility of analysing adult education budgeting. Present day methodologies of data capture and analysis make it possible and easier to determine costs and benefits of education programmes. There is software like Geographic Information Systems GIS to assist the policymakers in realizing where precisely the most needy adults are in terms of education or there are machine learning techniques to foresee the resultant effects of investment in education on economy and society in the long run (Gillen et al., 2021). Many of these innovations do not only enhance the precision of CBA but also enable its dissemination to policymakers who may not have technical competency. Use of technology also helps in the monitoring and evaluation process hence helps the policy makers to change direction and also put in the right resources where they are most needed.

Another opportunity that can further improve work with CBA approaches in Nigeria is cooperation with international organisations and NGOs. There is richness of experience in using CBA in educational planning among such organizations as the World Bank and UNESCO, which can offer technical cooperation, financial aid and capacity building. For example, the World Bank Systems Approach for Better Education Results (SABER) has been employed to compare the cost impact ofeducation policies in different countries proposing a framework that Nigeria could replicate (World Bank, 2022). This also includes pushing for integration of CBA into policy processes, NGOs use independent assessments to demonstrate the social value ultimate of AEPs. Engagement with these stakeholders can assist in countering tecnical/professional and financial challenges that follow the management of CBA such that it becomes sustainable in the context of budget implementation.

Undoubtedly, among myriad of advantages linked with CBA, one of the most valuable is the ability to use it for lobbying for more funds to an adult education. CBA can also help enhance the invisibility of funds for this sector from which the social and economic yields on investment are more demonstrable. For instance, literacy and numeracy programmes for adults were found to have assocated with increased labour productivity and less social exclusion, that fit in the larger Nigerian development agenda (OECD, 2021). Policy makers who get sound hike results from CBA are in a better place to defend the requirments on budget from legislatures and other stakeholders hence the problem of underfunding of adult education in Nigeria.

Consequently, the integration of CBA into adult education budgeting in Nigeria has potentials in improving resource allocation, creative use of technology and quality partnership. Through economic arguments, the CBA process not only communicates the benefits of adult Education, but it also creates understanding for better funding for sustainable development.

3.4. Cost Components in Adult Education Programmes

Cost factors in adult education programmes plays a major role in addressing the cost issues of education among adults. These costs are easy to quantify and are directly related to the cost of the programmes for adult education. These include issues to do with physical facilities, remunerations to teachers and other costs associated with teaching learning resources. The cost of the infrastructure development which includes construction of classroom, acquisition of furniture and installation of Information communication technology in learning centres are normally high (Olaniyan & Okemakinde, 2008). Salary remunerations of the teachers also form a large part of direct costs since well-trained teachers play a key role in implementing teaching processes. In addition, learning resources such as books, write, and use materials, and information technology teaching and learning aids are crucial in any teaching learning process. This is particularly so because the Nigerian government continues to underfund adult education, in addition to the skyrocketing cost of teaching and learning materials; hence, the increased direct costs as seen here have great implications on the sustainability of adult education programmes as captured by UNESCO (2020).

In contrast, there are system or indirect costs, which encompass all sort of consequential and less easily recognizable expenses. These are the cost of time which learners miss as they attend classes, this is very costly to adults who have to balance between work and college and other responsibilities. In Nigeria some of the challenges you have is many adult learners the lose their sources of income when they attend class which makes them loose some income in a round-about way Oni (2018). Moreover, transport and child

care expenses equally put extra costs to the learners. Such factors can explain low participation and programme retention thus minimizing the effectiveness of adult education programmes. Hence, while they are more difficult to measure, indirect costs are significant in determining theveness of these programmes.

A major problem of Nigeria in determining cost in its programmes in adult education is that often data is unavailable. Reporting of detailed financial and even operational details of such initiatives is sometimes lacking or is given in politically manipulated way which cannot be used to develop reasonable budgets or conduct cost benefit analyses (Nwosu & Okafor, 2016). This problem is made worse by the fact that Nigerian education system is highly decentralized and funding of adult education comes from both federal, state, and sometimes, private efforts. Poor definition and inadequate documentation of costs contribute to the problem because policymakers get inconsistent reports from various stakeholders. In addition, changes in the inflation rate as well as in the exchange rates compels the organization to consider other factors that might affect the formulation of long-term necessity for the funds.

Another difficulty is connected with the problem of regional differentiation. Any form of socio-economic and cultural differentiation is evident in Nigeria makes it possible to assumes that the cost factors that are of adult education is rather diverse. For example, the cost associated with accessing learners in rural areas may prove higher than in urban centers due to the challenges of transporting instructors and learning resources to these areas while the cost of the technology needed to support learning in urban centers may also be high. These disparities resulted in difficulty in creating a framework on a standardized cost estimation system (Adebayo & Lawal, 2019).

Thus, it can be postulated that there is the need to be able to identify these cost structure and factors for support and implementation of adult education programmes. Basic service delivery costs like construction of facilities, teachers' remuneration, and textbooks and other teaching aids are fairly hefty yet measurable while benefits which cost money elsewhere within the system or lost in the process, have a way of determining participation. Cost estimations in the Nigerian environment however are challenging due to the absence of data in some cases, inter-Regional differences and economic fluctuation. To overcome these challenges, there is need to increase the quality of the data collected, strive to involve more stakeholders and develop region-sensitive budgeting to make the continuation of adult education in Nigeria sustainable and accessible.

3.5. Policy Implications of Applying CBA to Adult Education

The use of CBA in adult education policies for Nigeria has implications of offering positive influence disclosure on the nature of policies the country can achieve for the advancement of education for adults. In this way, by comparing systematically all the costs and benefits tied to specific kinds of adult educations, policy-makers will be prepared to make the highest quality decisions concerning the distribution of assets as well as the prioritisation of programmes. Thus, for Nigeria, where the provision of most adult education faces numerous challenges including inadequate funding and access, the CBA approach may be useful to determine which areas should attract investment. For instance, the analyses reveal that adult literacy programmes enhance employment, health and voting, and in turn enhance the knowledge of citizens and the entire nation (Bohr & Nielsen, 2020). Through expresion of these advantages in term of relative worth to the cost incurred in the programme, CBA offers sound justification to policy makers on importance of investing in adult literacy and other forms of education at national level.

To this effect, through CBA, the adult education stands to benefit through being taken through more advocacy on how it can be funded sustainably. Something else that is of considerable concern in Nigeria is that a good percentage of people have a poor perception of adult education than form education. But research in the area of adult education shows that the returns on investment are social and economic. For instance, UNESCO (2019) opined that adult education programmes in the developing countries improve the productivity of workforce and the levels of poverty. With the help of CBA, policymakers are able to show that adult TVET needs to shape the long-terms gains such as the income level, the reliance on welfare etc., the social inclusion, and so on. These findings will support advocacy by providing concrete statistics that would help call for more funding from the government, private institutions, and intergovernmental organisations. Furthermore, it can also promote accountability in that any monies planned to be spent on interventions should be spent in areas of the highest economic returns to increase the level of public budget credibility.

Thus, incorporating CBA into Nigerian national budgeting policy will take considerable further strategy and partnership. First, there is a need to train policymakers and analyst in order to have human capital required to do and understand CBA. GIZ (2022) notes that due to practical skills and resources constraints, many LMICs are likely to face several barriers to implementing CBA. Nigeria can respond to this by: Engaging and collaborating with international organisations and or academic institutions that can help in the designing of training, based on the use of CBA methodologies. Second and most importantly, sound systems for data collection are crucial when it comes to CBA. At the moment, few, inadequate and outdated facts and figures characterise the financial performance and utilisation of adult education programmes in Nigeria (World Bank, 2021). This paper recommends setting up a purpose-built computerised reference system for recording programme costs, rate of participation, and impact since these can all improve CBAs. Last, it brings stakeholders, such as educators, civil society, and community leaders, on board so that CBA results are incorporated into policy dialogue and respond to beneficiaries' needs.

Therefore, the use of CBA in the adults education system in Nigeria has policy implications. Examples of how it can change policy include proving positive social and economic outcomes of adult education, calling for sustainable funding based on the benefits and informing national/international budgeting cycles with data and knowledge transfer. If all these strategies are implemented Nigeria will be able to build a strong adult education service delivery system.

3.6. Innovative Approaches to Addressing CBA Challenges

New strategies for optimising cost benefit analysis (CBA) problems in Nigeria can be considered vital for proper funding of the adult education. One of them is the integration of mechanisms forigenous data collection where local people are involved in the process of data collection concerning CBA. Current strategies of data collection used in Nigeria face challenges such as poor infrastructure, difficulty accessing the rural areas, and outdated databases. Management by local participants like educators, community leaders, and learners helps the collection of data relevant to costs and benefits by the programme at a community level. It means that data are most likely to be credible and realistic in presenting the situation within different communities, which stabilizes the overall quality of CBA. For example, when I explained how the technique of participatory rural appraisal (PRA) has been found to provide valid information in the context of limited resources in participating communities, Chambers (2020) supported it. Relative to other methods it is usually effective to highlight such pros in the context of adult education as improved level of civic engagement or intergenerational knowledge share that might not be so evident otherwise.

The incorporation of AI together with ML is another promising prospects for improving the CBA approach in adult education. Ed tech has the ability to analyze extensive amounts of data, pattern and even predict long-term impacts of educational interventions better than the traditional practices utilize by human experts. For instance, use of predictive analytics one can forecast the future economic outcomes of investing in adult education by using data on past literacy levels, trends of employment, as well as levels of income. An evaluation of this type can also alert policymakers on where to channel its resources for most effect. Moreover, AI can help appraise intangible values, for instance, relationship between the adult education and the health index and social inclusion (Zhang et al., 2022). This rising usage of digital innovation in Nigeria's governance and learning makes it appropriate to foster the use of AI innovation since challenges such as inadequate data privacy and unequal distribution of the needed digital resources are encountered.

Another crucial element of adult education funding is also public private partnership (PPPs) and in this case CBA insights. The fact that public funding of adult education is often limited while the need for extensive resources to support the delivery of those forms of education is tremendous, makes possible to consider PPPs as the means of filling this gap. In general, PPPs operationalise additional financial as well as technical resources from private sector stakeholders including corporations, NGOs, and philanthropic organisations. For example, companies may undertake youth literacy enhancement and poverty alleviation programmes for adults through their corporate social responsibility chest, and on the other hand, NGOs may offer professional consultancy services in conducting CBA. For instance, the Partnership for Education programme in Ghana to enhance educational relationship between the government and other parties such as NGOs successfully enhanced responsibilities for improved

education attainments of students as estimated by UNESCO (2021) Table 1. The various recommendations of this model when applied in Nigeria could assist in mitigating the problem of resource constraint in the delivery of adult education especially to the disadvantaged areas.

From this research, it is clear that best practices like using community knowledge, AI, and PPPs holds the potential to revolutionalise how CBA is adopted in funding adult education in Nigeria. With regard to existing problems, and taking into account these strategies, it is possible to achieve a more effective and fair distribution of resources for improving the quality and accessibility of adult education programmes in Nigeria.

4. Conclusion

The paper has provided a current state of adult education in Nigeria (Problem state) and observed various issues and challenges which include inadequate funding, shortage of qualified teachers or facilitators, and poor structural facilities for teaching and learning. That is why these problems are superimposed by cultural attitudes that deny value to education for adults and limit access to such education, especially for women and the population of rural areas. However, there are already some established adult education programmes; the sector remains underfunded and is largely marginalized in national policy frameworks. These barriers need a foreceful reform agenda to cover for funding, infrastructure, and training of right human capital. When well supported, adult education can be used as an effective tool of individual and national development, poverty eradication, literacy and social and economic mainstreaming.

Furthermore, the use of Cost-Benefit Analysis (CBA) in the case of adult education in Nigeria provides plausible recommendation for the management of resources and policies. However, some of the factors that might limit the use of the financial tool in the sector include; Limitation of Data, Lack of Technical expertise and Political Interference. Thus, if such challenges are to be addressed, enhanced investments in data systems should be made, policymakers' capacity developed, and bureaucracy reformed. More so, the implementation of CBA and accessing of funds for adult education can be boost by the use of technology and collaborations with the international organizations. CBA when incorporated into Nigeria's budgetary policies can help to inform practices that promote optimization of adult education while championing the development of relevant goals.

5. Recommendations

The direction which cost-benefit analysis (CBA) has taken or will take in the future in adult education in Nigeria depends on specific attempts to solve the existing problems and create a stable and efficient basis for its use. Building capacity in terms of programmes and training for policy makers and analyst is essential. Some of the problems hindering the use of CBA includes: Many of the decision-makers and budget analysts in Nigeria are not technically equipped to undertaking as well as analyzing CBA. The mentioned training campaigns may help to decrease it as well as improving the abilities of stakeholders to apply CBA methodologies properly. These programmes should be devoted to the more down-to-earth issues like a choice of the data collection methods, the estimation of costs, and the evaluation of benefits accumulating over time. In addition, cooperation with foreign organizations and universities may increase the effectiveness of training and open up an opportunity to use the more sophisticated equipment.

It is just as important to strengthen the institutional frameworks to help integrate CBA into the adult education budgeting mechanisms. There must be effective provision of institutional support to guarantee order, predictability, and responsibility in regard to the use of CBA. The creation of the specialised divisions within the appropriate ministries that would be charged with the implementation of CBA into the budgeting process may be viewed as the advance as well. These units should be charged with the responsibility of coming up with standard procedures and formats of undertaking CBAs, bearing in mind that different levels of government may be involved. Also, enhanced cooperation between the different agencies and departments will require sharing of resources and thus enhance the efficiency of implementation of CBA.

Problems of a systemic nature require demand and supply side strategic recommendations. It is suggested that policy makers should pay close attention to the issue in identifying the right resources for data gathering processes because data is an essential element in any sound use of the CBA. There should also be accompanied too, attempts to redress delays arising from bureaucratic barriers in embracing evidence based systems of decision making. It is

important to develop enablers that support the policy relevance of CBA findings. Finally the stakeholders, communities and civil society organizations should be involved so that the adult education programs contain policies that can effectively address the needs of the population. Altogether these actions create the right precondition for the further reasonable and effective application of CBA in Nigeria's adult education context.

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