Human Education Today for Tomorrow's World
Volume 22 Issue 1 · pp. 128–142 · DOI: 10.2478/hettw-2025-0020

Human Education Today for Tomorrow's World

Readability and sentiment analysis of Romanian national frameworks for adult learning and financial education

Research Article

Gavriluț Darie*

Department of Economics and Business, Faculty of Economic Sciences, University of Oradea, Oradea, Romania

Received 30 December 2025; Accepted 25 February 2026

Abstract: National education strategies increasingly function not only as administrative planning instruments but also as economic signaling devices, communicating priorities, institutional credibility, and expected behavioral responses to citizens, firms, and international partners. This study conducts a computational text analysis of Romania's two flagship policy documents governing adult learning in the 2024–2030 period: the National Strategy for Continuing Adult Education (SNECA) and the National Strategy for Financial Education (SNEF). Using Valence Aware Dictionary and sEntiment Reasoner sentiment analysis and the Gunning Fog readability index, the study evaluates whether these strategies are linguistically aligned with their stated economic and social objectives: increasing adult participation in lifelong learning, improving financial literacy, and supporting Romania's convergence with European human-capital benchmarks. The study contributes to the economics of education literature by integrating natural language processing tools into policy evaluation, moving beyond outcome indicators toward ex ante institutional communication quality. Results (to be computed empirically) are expected to show a structurally positive but institutionally dense sentiment profile, paired with high readability complexity, reflecting a tension between European alignment and domestic accessibility. The findings have implications for policy effectiveness, labor-market responsiveness, and inclusive growth strategies in emerging European Union economies.

Keywords: *Lifelong learning • Financial education • Sentiment analysis • Gunning Fog index • Education economics • Romania • Public policy communication*

1. Overview and background

Adult learning and financial literacy have emerged as central pillars of contemporary economic policy across advanced and emerging economies alike. In a global context characterized by rapid technological change, digitalization, demographic aging, and persistent productivity differentials, the accumulation of human capital beyond initial schooling has become a decisive determinant of long-run economic performance. Traditional models of growth, which emphasized capital accumulation and early-life education, have increasingly been complemented – and in some cases supplanted – by frameworks highlighting continuous skill formation, adaptability, and lifelong learning (Acemoglu & Autor, 2011; Hanushek & Woessmann, 2015).

From an economic perspective, adult learning serves multiple, interrelated functions. At the micro level, it enhances individual employability, wage prospects, and resilience to labor-market shocks. At the meso level, it facilitates firm-level productivity, innovation, and technological adoption. At the macro level, it supports aggregate growth, fiscal sustainability, and social cohesion by mitigating skill obsolescence and long-term unemployment. Empirical research consistently demonstrates that economies with higher rates of adult learning participation exhibit greater adaptability to structural change and technological diffusion (OECD, 2019; Desjardins, 2017).

Financial literacy occupies a complementary but distinct role within this broader human capital framework. While adult learning policies primarily target productive skills, financial education directly shapes individuals' capacity to make informed intertemporal choices regarding saving, borrowing, risk management, and

* *E-mail: darie.gavrilut@gmail.com*

investment. A substantial body of evidence links financial literacy to improved household balance sheets, retirement preparedness, and reduced vulnerability to economic shocks (Lusardi & Mitchell, 2014, 2017). At the systemic level, financially literate populations contribute to financial stability and more efficient capital allocation, reinforcing the effectiveness of monetary and fiscal policy.

The growing policy emphasis on adult learning and financial literacy reflects a recognition that human capital is no longer formed predominantly in early life, but rather through continuous interaction between individuals, institutions, and markets. As such, the effectiveness of policies in these domains depends not only on formal institutional arrangements and funding mechanisms, but also on how policies are communicated, interpreted, and internalized by their intended beneficiaries.

Within the European Union (EU), the shift toward lifelong learning and financial capability has been formalized through a series of strategic frameworks over the past two decades. The European Skills Agenda, the European Pillar of Social Rights, and the New European Agenda for Adult Learning collectively articulate a vision in which adult education is treated as a core component of economic competitiveness and social inclusion. These initiatives emphasize upskilling and reskilling, recognition of prior learning, and inclusive access to education across the life course.

At the same time, the EU has increasingly highlighted financial literacy as a prerequisite for consumer protection, financial inclusion, and sustainable growth. OECD–EU joint initiatives and EU-level recommendations stress the importance of national financial education strategies that address behavioral biases, information asymmetries, and unequal access to financial knowledge (OECD, 2016, 2020).

Importantly, these European frameworks do not merely prescribe policy objectives; they also implicitly establish discursive and communicative norms. National strategies are expected to demonstrate alignment with EU priorities, adopt shared terminology, and signal institutional capacity to implement reforms. As a result, policy documents often perform a dual function: they serve domestic governance needs while simultaneously acting as signals to supranational institutions, international partners, and investors.

This dual orientation has important implications for the language of policy strategies. While European alignment may enhance external credibility, it may also introduce complexity and abstraction that reduce accessibility for domestic audiences, particularly adult learners with lower educational attainment or limited institutional trust.

Romania represents a particularly instructive context in which to examine these dynamics. Since its accession to the EU, Romania has experienced sustained economic growth, structural transformation, and increasing integration into European markets. Nevertheless, the country continues to face significant challenges related to human capital formation, labor-market participation, and social inclusion. Empirical indicators consistently place Romania among the lowest-performing EU member states with respect to adult participation in lifelong learning. Eurostat data show that participation rates remain well below the EU average, reflecting a combination of structural, institutional, and informational barriers (Eurostat, 2022). These challenges are compounded by regional disparities, rural–urban divides, and persistent inequalities in educational attainment.

Financial literacy indicators reveal similar patterns. International surveys and national assessments suggest that large segments of the Romanian population lack basic financial knowledge, increasing vulnerability to over-indebtedness, financial exclusion, and economic insecurity. These issues have direct macroeconomic implications, affecting household savings rates, credit markets, and social protection systems.

In response to these challenges, Romanian authorities adopted two major strategic documents for the 2024–2030 period: the National Strategy for Continuing Adult Education (SNECA) and the National Strategy for Financial Education (SNEF). Together, these strategies aim to address skill mismatches, improve labor-market adaptability, and strengthen household financial decision-making, while aligning national policy with European frameworks.

From a policy-analysis standpoint, these documents represent comprehensive and ambitious efforts. They articulate clear objectives, identify institutional responsibilities, and propose mechanisms for coordination and monitoring. However, as with many national strategies, their ultimate effectiveness depends on more than formal adoption and administrative coherence. It depends critically on how these strategies are understood, trusted, and acted upon by their intended audiences.

Existing research and policy evaluation frameworks tend to assess national strategies primarily through implementation metrics (such as funding levels, program coverage, and institutional coordination) and outcome indicators (such as participation rates, employment outcomes, or financial behavior). While these dimensions are undoubtedly important, they overlook a crucial intermediate layer: policy communication. Public policy documents are not neutral technical artifacts. They are communicative instruments that frame problems, define priorities, and allocate responsibility. From an economic perspective,

they function as signals that shape expectations, reduce uncertainty, and coordinate behavior among heterogeneous agents – learners, employers, educators, and regulators.

The language of policy strategies (its tone, emotional valence, and complexity) can influence:

- whether individuals perceive policies as relevant and accessible,
- whether employers view them as credible and actionable,
- whether international institutions interpret them as signals of reform capacity.

Despite this, the linguistic properties of education and financial policy documents remain underexplored in the economics of education and public policy literature. This omission is particularly consequential in contexts such as Romania, where adult learning participation is low and institutional trust remains fragile. High levels of textual complexity may impose cognitive costs that disproportionately affect low-skilled adults, effectively functioning as a barrier to participation. Conversely, excessively optimistic or abstract language may undermine credibility if not matched by visible implementation capacity. Understanding these dynamics requires analytical tools capable of systematically evaluating policy language.

The purpose of this study is to address this gap by providing a computationally grounded analysis of policy language in Romania's national strategies for adult learning and financial education. Specifically, the study applies two established natural language processing tools (Valence Aware Dictionary and sEntiment Reasoner [VADER] sentiment analysis and the Gunning Fog readability index) to the full English translations of SNECA and SNEF.

The study is guided by three core research objectives:

- To assess the readability of Romania's adult learning and financial education strategies, and to evaluate whether their linguistic complexity is consistent with their stated inclusion goals.
- To analyze the sentiment profile of these strategies, examining how tone and emotional valence function as signals of optimism, urgency, or constraint within an institutional context.
- To interpret these linguistic characteristics through an economic framework, linking readability and sentiment to information costs, institutional credibility, and human capital formation.

By pursuing these objectives, the study contributes to multiple strands of literature. It extends the economics of education by integrating insights from computational linguistics, offering a novel method for ex ante policy evaluation. It contributes to financial literacy research by highlighting the role of communicative design in shaping behavioral responses. Finally, it enriches institutional and policy analysis by conceptualizing policy texts as economic signals embedded in language.

The study adopts a mixed theoretical–empirical approach. The remainder of the study is structured as follows: Section 2 develops the theoretical framework linking adult learning, financial literacy, and policy communication to economic outcomes. Section 3 reviews the relevant literature across education economics, financial literacy, and text-as-data methodologies. Section 4 describes the data and methodology, including translation and preprocessing. Section 5 outlines the results. Section 6 presents the conclusion.

2. Theoretical framework

Adult education has traditionally been analyzed within economics through the lens of human capital theory, where education is conceptualized as an investment decision undertaken by individuals and societies under conditions of uncertainty. In the foundational framework developed by Becker (1964), education increases individual productivity and future earnings, at the cost of present resources such as time, effort, and foregone income. While this framework was originally focused mainly on formal schooling during youth, later research has increasingly emphasized that education does not end with initial schooling but continues throughout the course of life. In modern economies, adult education has become a necessary complement to early-life education, rather than a marginal or corrective intervention. Research on adult education participation consistently identifies institutional complexity and informational opacity as major barriers. A previous study distinguishes between situational, dispositional, and institutional barriers, emphasizing that institutional design often amplifies inequalities rather than mitigating them. Another study further argues that adult learning systems are shaped by governance structures that implicitly favor already-educated groups.

Adult education differs in important ways from initial education. Decisions to participate in learning later in life are taken under higher opportunity costs, as adults are often employed, have family responsibilities, and face tighter time constraints. Moreover, the expected returns to adult education are more uncertain, as individuals have shorter remaining working lives and outcomes depend strongly on labor market conditions. Because of this, participation in adult learning is highly sensitive to institutional context, policy incentives, and the availability of clear

and credible information. From this perspective, adult education policy is not only about providing training opportunities, but also about shaping expectations and reducing uncertainty surrounding the value of participation.

Empirical evidence consistently shows that adult education generates positive labor market outcomes, although the magnitude of these effects varies across groups. Participation in adult learning is associated with higher employability, greater job stability, and improved wage prospects, particularly in contexts of technological change. However, returns are not evenly distributed. Adults with higher initial education levels tend to benefit more, while those with lower skills often face greater barriers to participation and weaker returns. This creates a potential policy paradox, in which those who would benefit most from adult education are the least likely to participate. Public intervention is therefore justified not only on equity grounds, but also to correct market failures related to information asymmetries and risk.

From a macroeconomic perspective, adult education plays a crucial role in sustaining long-term growth. Endogenous growth models emphasize that productivity growth depends not only on innovation at the technological frontier, but also on the diffusion and adoption of existing technologies throughout the economy. Aghion and Howitt (2009) argue that continuous skills upgrading among incumbent workers is essential for firms to implement new technologies effectively. Without sufficient adult learning, technological change may lead to polarization rather than growth, as only a subset of workers is able to adapt. This mechanism is especially relevant in the EU, where demographic aging and slower population growth place additional pressure on productivity. EU policy documents repeatedly stress that raising adult learning participation is essential for maintaining competitiveness and fiscal sustainability. Studies at the EU level show that countries with stronger lifelong learning systems are better able to absorb economic shocks and restructure their labor markets in response to crises (OECD, 2019). Conversely, low participation in adult education is associated with higher long-term unemployment and lower labor productivity growth.

In transition and middle-income economies, such as Romania and other Central and Eastern European countries, adult education plays an additional structural role. These economies often inherit skill structures that are poorly aligned with market needs, due to legacies of central planning and delayed institutional reforms. Campos and Coricelli (2002) argue that such rigidities slow convergence and reduce the effectiveness of market reforms. Adult education can help mitigate these problems by facilitating labor reallocation and supporting structural transformation. However, participation rates in lifelong learning remain significantly lower in these countries than in Western Europe, suggesting that formal policy adoption has not translated into effective engagement.

Alongside adult education, financial literacy has become an increasingly important focus of economic research and public policy. Financial education is generally understood as the process through which individuals acquire the knowledge and skills necessary to make informed financial decisions. Unlike occupational skills, financial literacy directly affects intertemporal decision-making, influencing saving, borrowing, investment, and risk management behavior.

Lusardi and Mitchell (2014, 2017) provide extensive evidence that financial literacy is strongly associated with wealth accumulation and financial resilience across countries. These relationships remain robust even after controlling for income and education, suggesting that financial knowledge has an independent effect on behavior. From a macroeconomic perspective, financially literate populations contribute to financial stability and more efficient allocation of capital. OECD studies emphasize that financial literacy reduces the likelihood of over-indebtedness and supports the functioning of financial markets, particularly in environments characterized by complex financial products (OECD, 2016, 2020).

Despite widespread recognition of its importance, the effectiveness of financial education remains contested. Some studies find that traditional financial education programs have limited impact on behavior, especially when information is presented in abstract or technical terms. Behavioral economics provides useful insights into these mixed findings. Individuals do not process information in a fully rational manner; instead, they are subject to cognitive biases, limited attention, and heuristic decision-making. Thaler and Sunstein (2008) show that framing effects and cognitive load significantly influence choices, implying that how information is communicated matters at least as much as what information is provided.

These insights are particularly relevant for policy design. Education and financial strategies are typically articulated through formal policy documents that aim to translate broad objectives into actionable frameworks. However, these documents are often written in highly technical language, reflecting administrative and legal considerations rather than the needs of end users. From an institutional economics perspective, policy documents function as commitment devices that signal priorities and coordinate expectations among economic agents (North, 1990). Their effectiveness therefore depends on credibility, clarity, and accessibility.

The concept of administrative burden further highlights the importance of policy communication. A previous study suggests that complex rules and opaque language impose learning costs on citizens, which can discourage participation even when programs are formally inclusive. These learning costs are not evenly distributed; individuals with lower education or weaker institutional trust face disproportionately higher burdens. In economic terms, such complexity functions as a transaction cost that reduces effective demand for public programs.

The growing field of text-as-data research provides tools to analyze these issues empirically. In economics and finance, computational text analysis has been used to study corporate disclosures, regulatory documents, and monetary policy communication. Readability measures, such as the Gunning Fog index, have been applied to assess information complexity and transparency. Loughran and McDonald (2014) show that more complex financial disclosures are associated with greater information asymmetry and higher risk premiums, indicating that textual characteristics have real economic consequences. Similarly, sentiment analysis has been employed to capture the tone and emotional valence of economic communication. Studies show that sentiment in policy statements and corporate reports influences investor expectations, asset prices, and macroeconomic forecasts. In the European context, research on central bank communication demonstrates that the tone of European Central Bank statements affects financial markets independent of policy actions, suggesting that language itself is an economic instrument.

Despite these advances, the application of text-as-data methods to education policy remains limited. Most evaluations of education strategies focus on implementation indicators and outcomes, such as participation rates or employment effects. While these metrics are important, they overlook the role of policy language as an upstream determinant of effectiveness. Education policy documents are routinely assessed by international organizations, investors, and rating agencies as indicators of future labor supply quality and growth potential. However, their readability and tone are rarely analyzed systematically. This gap is particularly relevant in the EU, where national strategies are expected to align with EU-level discursive norms. Documents such as the European Skills Agenda establish a shared vocabulary that member states are encouraged to adopt. While such alignment may enhance external credibility, it may also increase abstraction and complexity, making documents less accessible to domestic audiences. Several EU studies note that adult learners with lower educational attainment often report difficulty understanding policy information, which may discourage participation (CEDEFOP, 2020).

Romania illustrates these challenges clearly. Despite adopting comprehensive strategies aligned with EU priorities, adult participation in lifelong learning remains low, and financial literacy levels are among the lowest in the Union. Existing research tends to attribute these outcomes to limited funding, institutional fragmentation, or weak implementation capacity. While these factors are undoubtedly important, they do not fully explain why participation remains low even when programs are available. The possibility that policy language itself acts as a barrier has received little attention.

From a theoretical standpoint, integrating linguistic analysis into the economics of education aligns with broader efforts to incorporate information frictions and behavioral constraints into human capital models. Education policies operate in environments characterized by uncertainty, heterogeneity, and bounded rationality. Clear and accessible communication can reduce uncertainty and lower participation costs, while complex and opaque language can undermine even well-designed policies.

This study contributes to the literature by applying established computational tools – the Gunning Fog readability index and VADER sentiment analysis – to national strategies for adult education and financial literacy. The Gunning Fog index provides a quantitative measure of textual complexity that can be interpreted as a proxy for cognitive access costs. VADER sentiment analysis captures emotional tone and evaluative stance, allowing for assessment of optimism, urgency, and constraint in institutional discourse. Together, these tools enable a systematic examination of policy language that complements traditional outcome-based evaluations.

Overall, the literature suggests that adult education and financial literacy are key determinants of economic performance in the context of technological change and demographic pressure. However, policy effectiveness depends not only on design and implementation, but also on communication. Linguistic complexity, tone, and framing influence participation, trust, and credibility, with downstream effects on human capital formation and economic outcomes.

3. Literature review

This study intersects four major bodies of literature that have, until now, largely evolved in parallel rather than in direct dialogue: the economics of lifelong learning, research on financial literacy and policy design, studies

on readability and policy effectiveness, and the growing application of sentiment analysis in public policy and institutional communication. Each of these strands provides important insights into how education-related policies are designed, communicated, and evaluated, yet their integration remains limited, particularly in the context of emerging EU economies.

Research in the economics of lifelong learning has consistently demonstrated that adult education yields positive labor-market returns, though these returns are heterogeneous across individuals, sectors, and institutional environments. Early human capital theory, as developed by Becker (1964), conceptualized education as an investment decision where individuals compare expected future benefits with current costs. While Becker's framework initially focused on formal education during youth, later contributions extended the analysis to adult education, emphasizing that learning over the life course has become increasingly important in economies characterized by rapid technological change.

Empirical studies across OECD countries find that participation in adult education is associated with higher employability, improved job stability, and wage growth, particularly in periods of structural change. However, these effects are unevenly distributed. Desjardins (2017) shows that individuals with higher initial education levels tend to benefit more from adult learning, while those with lower skills face higher barriers to entry and often receive lower returns. This heterogeneity raises important questions regarding the inclusiveness and efficiency of adult education policies. If participation is skewed toward already advantaged groups, lifelong learning may reinforce, rather than reduce, existing inequalities.

At the macroeconomic level, lifelong learning is increasingly viewed as a key driver of productivity growth and economic resilience. OECD (2020) emphasizes that adult skills upgrading supports technology adoption and innovation diffusion, allowing firms and workers to adjust more quickly to changing market conditions. Endogenous growth models highlight that human capital accumulation among adults is essential for sustaining long-run growth, particularly in aging societies where the relative importance of initial education declines over time. In this context, adult education is not merely a social policy instrument but a core component of economic strategy.

Within the EU, lifelong learning has become a central policy priority, reflected in initiatives such as the European Skills Agenda and the New European Agenda for Adult Learning. Comparative studies across EU member states reveal substantial variation in participation rates and institutional arrangements. Northern and Western European countries tend to exhibit higher adult learning participation, supported by strong institutional coordination and employer involvement. In contrast, many Southern and Eastern European countries, including Romania, display persistently low participation rates despite formal policy commitments. This suggests that factors beyond policy availability, such as institutional trust and information accessibility, may play an important role.

Closely related to lifelong learning is the literature on financial literacy and policy design. Financial literacy research focuses on individuals' ability to understand financial concepts and make informed decisions regarding saving, borrowing, investment, and risk management. A large body of empirical work documents a positive relationship between financial literacy and desirable financial behaviors. Lusardi and Mitchell (2014) show that financially literate individuals are more likely to plan for retirement, accumulate wealth, and avoid high-cost debt products. These findings are robust across countries and income levels.

However, when it comes to policy interventions, the evidence is more mixed. Meta-analyses by Fernandes et al. (2014) suggest that traditional financial education programs often have limited impact on behavior, particularly when measured over longer time horizons. Kaiser and Menkhoff (2017) find more positive effects, but emphasize that outcomes depend strongly on program design, delivery mechanisms, and learner engagement. These mixed results have led to increasing attention to behavioral factors and communication strategies in financial education.

Behavioral economics provides a useful framework for understanding why financial education programs may fail to achieve their intended outcomes. Individuals face cognitive constraints, limited attention, and various behavioral biases that affect how information is processed. As a result, simply providing information is often insufficient to change behavior. The way in which information is framed, the emotional tone of communication, and the perceived relevance of content all influence engagement and learning outcomes. This insight has important implications for policy design, suggesting that financial education strategies must pay close attention to communication and presentation, not only to content.

At the policy level, financial literacy has been increasingly linked to broader economic objectives such as financial stability, consumer protection, and inclusive growth. OECD (2016, 2020) reports emphasize that financially literate populations contribute to more efficient capital allocation and reduce systemic risks associated with over-indebtedness and misinformed investment behavior. Within the EU, financial education is often promoted as

part of consumer protection frameworks, with national strategies encouraged to align with EU-level guidelines. Nevertheless, large disparities persist across member states, both in terms of financial literacy levels and policy effectiveness.

A third strand of literature relevant to this study concerns readability and policy effectiveness. Readability indices, such as the Gunning Fog index, have been widely used to assess the accessibility of texts in fields such as health communication, legal studies, and financial reporting. These indices provide quantitative measures of linguistic complexity, typically based on sentence length and word difficulty. While originally developed for educational purposes, readability measures have been increasingly applied in economics and finance to study information asymmetry and transparency.

Loughran and McDonald (2014) show that complex corporate disclosures are associated with higher uncertainty and greater information asymmetry, leading to higher risk premiums demanded by investors. Similar findings have been reported in studies of legal documents and regulatory texts, where excessive complexity tends to favor expert audiences and disadvantage lay readers. These results suggest that readability is not merely a stylistic concern, but an economically relevant characteristic of policy communication.

In the context of public policy, readability has implications for participation, compliance, and trust. Complex and opaque policy documents impose learning costs on citizens, which can discourage engagement and reduce program uptake. A previous study conceptualizes these learning costs as part of administrative burden, emphasizing that they disproportionately affect individuals with lower education or limited institutional trust. From an economic perspective, poor readability can be understood as an implicit transaction cost that reduces the effectiveness of policy interventions.

Despite the relevance of readability, relatively few studies apply readability analysis to education policy documents. Most evaluations of education strategies focus on implementation indicators, such as funding levels and institutional coordination, or outcome measures, such as participation rates and employment effects. While these approaches are valuable, they overlook the role of policy language as an upstream determinant of effectiveness. If policy documents are difficult to understand, they may fail to engage their intended audiences, regardless of the quality of the underlying policy design.

The fourth body of literature relevant to this study concerns sentiment analysis in public policy and institutional communication. Sentiment analysis refers to the use of computational methods to identify and quantify emotional tone in text. Originally developed in the context of marketing and social media analysis, sentiment analysis has been increasingly applied to economic and policy-related texts. Studies have examined sentiment in central bank communications, budget speeches, regulatory announcements, and corporate disclosures.

Bholat et al. (2015) apply sentiment analysis to central bank communication and show that the tone of policy statements affects market expectations and asset prices. Hansen and McMahon (2016) demonstrate that linguistic features of central bank statements, including sentiment and clarity, influence financial market reactions independent of policy decisions themselves. These findings support the idea that language is not neutral, but actively shapes economic behavior.

In the context of public policy, sentiment can be interpreted as a signal of institutional stance, reflecting optimism, urgency, or constraint. Policy documents with strongly positive sentiment may signal confidence and commitment, while more cautious or negative tone may reflect uncertainty or limited capacity. However, excessive optimism can also undermine credibility if not matched by visible implementation efforts. This suggests that sentiment must be interpreted in conjunction with other textual features, such as readability and specificity. Although sentiment analysis has been widely applied in macroeconomic and financial contexts, its use in education policy analysis remains limited. Education strategies are often treated as purely technical documents, with little attention paid to their emotional tone or communicative function. This is a notable gap, given that education policies aim to influence behavior and participation over long time horizons, often among populations with limited institutional trust.

Taken together, these four strands of literature point to the importance of viewing education and financial policies not only as sets of formal measures but also as communicative instruments embedded in language. Lifelong learning and financial education policies operate in environments characterized by uncertainty, information asymmetry, and heterogeneous agents. Their effectiveness depends not only on funding and institutional arrangements, but also on how policies are communicated, perceived, and internalized by individuals and stakeholders.

Despite significant progress in each of the four literatures, there remains a lack of integrated analysis that combines insights from economics of education, financial literacy research, readability studies, and sentiment analysis. In particular, no study to date applies sentiment and readability analysis jointly to national adult education and

financial education strategies, especially in emerging EU economies. This gap is surprising, given that these economies often face the greatest challenges in terms of participation, trust, and institutional capacity.

By bringing together these strands, the present study seeks to contribute to a more comprehensive understanding of policy effectiveness. Applying computational text analysis tools to education and financial strategies allows for a systematic assessment of policy language, providing insights that complement traditional outcome-based evaluations. In doing so, the study responds to calls for more interdisciplinary approaches in policy analysis and highlights the economic relevance of communication in shaping human capital formation.

4. Data and methodology

This study relies on official national policy documents as primary data sources and applies computational text analysis methods to examine their linguistic characteristics. The methodological approach combines document analysis with natural language processing techniques, allowing for a systematic evaluation of policy language that goes beyond conventional qualitative assessment. The general idea of the methodology is to treat policy texts not only as legal or administrative instruments but also as economic and institutional objects, whose tone and complexity may influence behavior, expectations, and ultimately policy effectiveness.

The primary sources used in the analysis are two strategic documents adopted by Romanian public authorities for the 2024–2030 policy cycle. The first document is the SNECA, issued by the Romanian Ministry of Education. This strategy represents the main policy framework for adult learning in Romania and addresses issues related to participation in lifelong learning, skills development, governance arrangements, and funding mechanisms. It includes references to EU priorities and outlines coordination mechanisms among national, regional, and local actors.

The second document is the SNEF, coordinated by Romanian public authorities in cooperation with financial regulators and other public institutions. This strategy focuses on improving financial literacy, promoting financial inclusion, and strengthening consumer protection. It targets a broad range of population groups, including adults, young people, and vulnerable categories, and aims to align national financial education efforts with EU and OECD recommendations.

Both strategies are officially published in Romanian. For the purpose of this study, English translations were used in order to ensure compatibility with natural language processing tools, which are primarily developed for English-language texts. The translations were machine-assisted and then reviewed to ensure basic coherence and consistency. The use of translated texts represents a potential source of bias, as certain linguistic nuances, sentence structures, or stylistic features may be altered in the translation process. This limitation is acknowledged explicitly, and the results are interpreted with caution. However, prior studies suggest that sentiment and readability metrics remain informative when applied to translated policy documents, especially when the analysis focuses on relative differences and patterns rather than absolute values.

The analytical units of the study are defined at three levels. First, each strategy is analyzed as a whole document, allowing for an overall assessment of tone and readability. Second, major structural components of the strategies – such as vision statements, strategic objectives, and implementation sections – are analyzed separately. Third, thematic clusters are identified, including sections related to skills development, inclusion, governance, and financial behavior. This multi-level approach allows for a more detailed understanding of how language varies across different policy dimensions and intended audiences.

The methodological framework combines two computational text analysis techniques: sentiment analysis using the VADER model and readability assessment using the Gunning Fog index. These tools were selected due to their transparency, interpretability, and established use in economics, finance, and public policy research.

Sentiment analysis is used to capture the emotional tone and evaluative stance of the policy texts. The study employs VADER, a lexicon-based sentiment analysis model developed by Hutto and Gilbert (2014). VADER was initially designed for analyzing sentiment in social media and online communication, but it has since been widely applied to political discourse, institutional communication, and policy documents. One of the main strengths of VADER is that it accounts not only for word-level sentiment but also for contextual features such as negation, punctuation, and degree modifiers.

VADER generates four sentiment scores: positive, negative, neutral, and compound. The first three scores represent the proportion of text associated with each sentiment category, while the compound score provides a normalized summary measure of overall sentiment, ranging from −1 to +1. In policy analysis, these scores can be interpreted as indicators of institutional optimism, caution, or constraint. Previous research has shown that sentiment in policy communication influences expectations, credibility, and market reactions (Bholat et al., 2015;

Hansen & McMahon, 2016). In the present study, sentiment results are interpreted carefully and always in conjunction with readability measures and contextual knowledge.

Readability is assessed using the Gunning Fog index, one of the most established readability formulas in applied research. The Gunning Fog index was developed by Robert Gunning in the early 1950s as a practical tool to estimate the number of years of formal education required for a reader to understand a text on first reading (Gunning, 1952). The index is calculated using two main components: average sentence length and the proportion of complex words, typically defined as words containing three or more syllables. The resulting score corresponds approximately to a US grade level.

The Gunning Fog index has been widely used in studies of financial disclosures, legal texts, medical communication, and public policy documents. In economics and finance, research demonstrates that texts with higher Fog scores are associated with greater information asymmetry and lower transparency (Loughran & McDonald, 2014). In public policy contexts, high readability scores may indicate that documents are primarily written for expert audiences, rather than for the general public or intended beneficiaries. To support interpretation, Table 1 presents the commonly accepted classification of Gunning Fog scores and their corresponding descriptions.

In the context of this study, Fog scores above 17 are interpreted as indicating graduate-level or expert-level complexity. Such levels may be appropriate for technical audiences, but they can impose significant cognitive access costs for general adult learners. From an economic perspective, these costs can be understood as implicit transaction costs that reduce effective participation and engagement. The analytical strategy integrates sentiment and readability results within a broader economic interpretation framework. Sentiment scores are interpreted as indicators of institutional stance, capturing degrees of optimism, urgency, or caution embedded in policy language. Readability scores are interpreted as proxies for cognitive access costs faced by potential beneficiaries. Cross-document comparisons between SNECA and SNEF allow for an assessment of policy coherence, examining whether strategies addressing related domains adopt similar communicative approaches or differ substantially in tone and complexity.

Results are reported both at the document level and at the section level, allowing for identification of internal variation within strategies. It is expected, for example, that vision statements may exhibit more optimistic and abstract language, while implementation sections may be more technical and complex. Such differences have implications for how various audiences perceive and interpret policy commitments.

Overall, the methodological approach combines established computational tools with an economic interpretation grounded in human capital theory, institutional economics, and behavioral insights. While limitations exist, particularly regarding translation and lexicon-based sentiment analysis, the approach provides a transparent and replicable framework for analyzing policy language. By making linguistic features measurable, this methodology complements traditional policy evaluation techniques and contributes to a more complete understanding of how education and financial strategies may influence economic behavior and outcomes.

4.1 Results

Table 2 reports the Gunning Fog readability indices computed on the full English translations of Romania's two national strategies. The results indicate exceptionally high levels of linguistic complexity in both documents.

Both strategies fall well within the range associated with expert-level or postgraduate textual complexity, according to standard interpretations of the Gunning Fog index (Gunning, 1952; DuBay, 2004). A Fog score above 20 implies that a reader would require more than 20 years of formal education to understand the text on first reading. In economic terms,

Gunning Fog score	Approximate education level required	Description of text complexity
6–8	Primary education	Very easy to read; simple sentences and basic vocabulary
9–12	Secondary education	Standard, accessible texts; typical of newspapers
13–16	Undergraduate education	Moderately complex; academic or professional texts
17–20	Graduate education	Highly complex; specialized academic or technical texts
21+	Postgraduate/expert level	Very complex; legal, bureaucratic, or highly technical documents

Table 1. Interpretation of Gunning Fog index scores.

Source: own adaptation by the author.

Strategy	Sentences	Words	Complex words (≥3 syllables)	Gunning Fog index
SNEF	833	21,684	6,502	22.41
SNECA	833	14,702	4,907	20.41

Table 2. Computed Gunning Fog scores.
Source: Own analysis conducted by the author.

this level of complexity suggests the presence of very high cognitive access costs, particularly for individuals with medium or low levels of educational attainment.

A notable result is that the SNEF exhibits a higher Fog score (22.41) than the SNECA (20.41). From a policy-design and economic perspective, this finding is somewhat counterintuitive. Financial education strategies are typically intended to reach population groups that are financially vulnerable or informationally constrained, such as low-income households, young adults, rural populations, and individuals with limited formal education. A large body of literature in financial literacy and behavioral economics indicates that these groups are particularly sensitive to complexity and abstraction in informational materials (Lusardi & Mitchell, 2014; Kaiser & Menkhoff, 2017).

From the standpoint of information economics, excessive linguistic complexity can be interpreted as a form of implicit transaction cost. When policy texts are difficult to read and process, individuals face higher costs in acquiring and interpreting information, which may discourage engagement even when expected benefits are positive. This mechanism resembles classical models of information asymmetry, where costly information acquisition leads to suboptimal decision-making (Stiglitz, 2000). In the context of financial education, such costs may reduce participation in educational programs, limit behavioral change, and ultimately weaken the macro-economic effectiveness of the policy.

Cognitive load theory provides an additional explanatory framework for interpreting these results. According to Sweller (1988), learning outcomes deteriorate when the cognitive demands imposed by instructional materials exceed the processing capacity of working memory. Financial education already involves inherently complex concepts – such as compound interest, inflation, risk diversification, and intertemporal choice – which place significant intrinsic load on learners. When such content is embedded in highly complex linguistic structures, extraneous cognitive load increases, reducing comprehension and retention. Empirical studies confirm that simplification of language and structure improves financial understanding and decision quality, particularly among low-literacy groups (Lusardi et al., 2017).

The elevated Fog score of the SNEF document therefore suggests a potential misalignment between policy objectives and communicative execution. While the strategy emphasizes inclusion, empowerment, and behavioral change, its linguistic form may inadvertently exclude precisely those groups it seeks to support. From an economic policy perspective, this misalignment can weaken the return on public investment in financial education, as the effectiveness of the intervention depends not only on content but also on uptake and comprehension.

By comparison, the SNECA, although still highly complex, registers a slightly lower Fog score. This difference may be partially explained by the document's institutional orientation. Adult education strategies often target ministries, training providers, employers, and local authorities, whose representatives are more likely to possess higher educational qualifications. In this sense, a higher level of technical language may be more justifiable. However, even in this case, a Fog score exceeding 20 suggests a degree of complexity that goes beyond what is necessary for effective communication.

From the perspective of human capital theory, adult learning policies aim to reduce skill mismatches and improve labor-market adaptability (Becker, 1964; Hanushek & Woessmann, 2015). If policy documents themselves are difficult to understand, they may fail to clearly convey available opportunities, rights, and incentives to potential participants. This can contribute to persistently low participation rates in lifelong learning, a problem that Romania continues to face according to Eurostat indicators (Eurostat, 2022). In this sense, linguistic complexity may indirectly reinforce existing inequalities in human capital accumulation by privileging individuals with higher educational backgrounds.

It is also relevant to consider the signaling role of policy documents. In institutional economics, policy texts function as signals of commitment, capacity, and credibility (North, 1990). Highly complex language may signal technical competence to supranational institutions or expert audiences, such as the European Commission or international organizations. However, the same language may simultaneously reduce credibility among domestic stakeholders if it is perceived as detached, bureaucratic, or inaccessible. This trade-off between external signaling and internal accessibility is particularly salient for EU member states seeking to demonstrate alignment with European frameworks while addressing domestic participation gaps.

Plain language guidelines adopted in several jurisdictions provide a useful benchmark. For example, the Plain Writing Act in the United States and similar EU-level recommendations emphasize that documents intended

for broad public audiences should generally not exceed a Fog index of 12–14 (PLAIN Language Action and Information Network, 2011). Both Romanian strategies exceed this threshold by a substantial margin, suggesting that they are written primarily for expert or administrative audiences rather than for citizens or learners.

It is important to acknowledge the limitations of readability formulas such as the Gunning Fog index. These measures do not account for semantic familiarity, conceptual coherence, or document design elements such as headings, bullet points, and visual aids, all of which influence comprehension. Moreover, the classification of complex words based solely on syllable count may overestimate difficulty in policy domains where multisyllabic terms are standard and unavoidable. Translation effects may also influence sentence length and word structure. Nevertheless, despite these limitations, readability indices remain valuable diagnostic tools, particularly when used comparatively and interpreted within a broader analytical framework (DuBay, 2004). The present analysis does not imply that the Romanian strategies are substantively flawed or poorly designed. Rather, it draws attention to an often-overlooked dimension of policy effectiveness: linguistic accessibility. From an economic perspective, accessibility affects participation, trust, and behavioral response, which in turn shape the efficiency of public spending and the achievement of policy goals. In areas such as financial education, where individual decision-making plays a central role, communication quality is not peripheral but fundamental.

The sentiment analysis results derived from the VADER framework provide an additional and complementary perspective on the communicative characteristics of Romania's national strategies for adult education and financial education. Table 3 reports the distribution of negative, neutral, and positive sentiment scores for the SNECA (strategy for continuing education and training/ SNECA) and the SNEF. In both cases, the results are dominated by neutral sentiment, with relatively small proportions of positive and negative affective content.

At a descriptive level, both documents exhibit very similar sentiment profiles. The Adult Continuing Education Strategy records a negative sentiment score of 0.028, a neutral sentiment score of 0.849, and a positive sentiment score of 0.123. The financial education strategy displays a slightly higher negative sentiment score of 0.030, a marginally higher neutral sentiment score of 0.859, and a lower positive sentiment score of 0.111. These distributions are consistent with what has been observed in other analyses of formal policy documents and institutional communications, where neutrality tends to dominate due to the technical and bureaucratic nature of the language (Bholat et al., 2015; Hansen & McMahon, 2016).

	Negative sentiment	Neutral sentiment	Positive sentiment
SNEF	0.028	0.849	0.123
SNECA	0.030	0.859	0.111

Table 3. VADER scores for SNEF and STECA.
Source: own computation by the author by using Python.

From an economic perspective, the predominance of neutral sentiment can be interpreted as a deliberate institutional strategy. In the economics of policy communication, neutrality often functions as a credibility-preserving device. Highly neutral language reduces the risk of overpromising and limits the exposure of policymakers to reputational costs in the event of implementation shortfalls. In this sense, neutral sentiment may signal prudence, administrative seriousness, and compliance with formal governance norms (North, 1990). This is particularly relevant in the context of EU member states, where national strategies are subject to scrutiny by supranational institutions and peer-review mechanisms.

However, neutrality also has potential costs. Behavioral economics suggests that emotionally flat communication may reduce salience and engagement, particularly among non-expert audiences (Thaler & Sunstein, 2008). For policies aimed at changing individual behavior, such as participation in adult learning or improvements in financial decision-making, some degree of positive framing and motivational language may be necessary to overcome inertia and bounded rationality. In this light, the high neutral scores observed in both strategies may contribute to limited behavioral response, especially among groups with low baseline participation or low institutional trust.

The relatively low positive sentiment scores in both documents reinforces this interpretation. Although the adult education strategy exhibits a slightly higher positive sentiment score than the financial education strategy (0.123 vs 0.111), the difference is modest. In absolute terms, positive sentiment represents only a small fraction of the overall linguistic content. This suggests that both strategies rely primarily on descriptive and procedural language rather than aspirational or motivational framing.

In economic terms, this has implications for the incentive structure embedded in policy communication. Human capital theory emphasizes that individuals invest in education when expected benefits are salient and perceived as attainable (Becker, 1964). If policy documents fail to clearly and

positively articulate the potential returns to adult learning or financial capability, individuals may underestimate the benefits and opt out of participation. This mechanism is particularly relevant in Romania, where opportunity costs of participation in education are relatively high for low-income adults and where informal labor remains significant.

The comparison between the two strategies reveals a particularly important asymmetry. The financial education strategy exhibits both a higher neutral sentiment score and a lower positive sentiment score than the adult education strategy. This pattern is notable because financial education policies often target behavioral change more directly than adult education policies. Financial decisions involve risk perception, intertemporal trade-offs, and self-control, all of which are known to be sensitive to framing and emotional cues (Lusardi & Mitchell, 2014; Barberis, 2018). A communication strategy that is overly neutral may fail to activate the cognitive and motivational mechanisms required to influence such decisions.

From a macroeconomic perspective, the sentiment profile of financial education policy texts may also affect systemic outcomes. Financial literacy is linked to household savings behavior, debt management, and participation in formal financial markets, which in turn influence capital accumulation and financial stability (OECD, 2016). If policy communication does not sufficiently emphasize positive outcomes or reduce perceived complexity and risk, households may remain disengaged from formal financial instruments, limiting the broader economic impact of financial education initiatives.

The negative sentiment scores in both documents are low, which is consistent with the avoidance of alarmist or confrontational language in official strategies. Nevertheless, the financial education strategy exhibits a marginally higher negative sentiment score than the adult education strategy. While the difference is small, it may reflect the inclusion of language related to financial risks, consumer protection, fraud, and vulnerability. Such content is arguably necessary in financial education contexts, but it also introduces elements of caution and constraint that may dampen positive engagement if not balanced carefully.

Institutional economics provides a useful framework for interpreting this pattern. Policy texts operate as signals not only of intent but also of perceived constraints and risks (Spence, 1973; North, 1990). The inclusion of risk-oriented language in financial education strategies may signal regulatory vigilance and concern for consumer protection to external audiences, such as EU institutions or financial markets. At the same time, it may reinforce risk aversion among households, particularly in societies with low trust in financial institutions.

When considered together with the readability results, the sentiment findings point toward a coherent but potentially problematic communicative equilibrium. Both strategies are characterized by high linguistic complexity and high emotional neutrality. From an economic standpoint, this combination increases information costs while offering limited motivational cues. For highly educated institutional actors, this may not pose a significant barrier. For ordinary citizens and adult learners; however, the joint effect may be disengagement or passive compliance rather than active participation.

It is also important to consider the signaling role of these documents in the European policy environment. National strategies serve not only domestic purposes but also function as artifacts of compliance and alignment with EU priorities. Neutral sentiment and technocratic language may therefore be rational from a signaling perspective, as they reduce ambiguity and demonstrate administrative capacity. However, this external signaling function may come at the expense of internal effectiveness, particularly in contexts where participation rates are low and behavioral change is required.

In methodological terms, the application of VADER sentiment analysis to policy texts demonstrates the usefulness of computational tools in making such trade-offs empirically visible. While sentiment scores should not be interpreted as direct measures of policy quality, they provide valuable indicators of institutional stance and communicative orientation. When embedded within an economic framework, sentiment analysis can help explain why well-designed policies sometimes fail to achieve their intended outcomes.

As such, the VADER sentiment analysis reveals that Romania's national strategies for adult education and financial education are characterized by dominant neutrality, limited positive framing, and minimal negative affect. The slightly more neutral and less positive tone of the financial education strategy raises specific concerns regarding its capacity to motivate behavioral change among financially vulnerable populations. From an economic perspective, these findings suggest that policy effectiveness depends not only on substantive design and funding, but also on the emotional and linguistic signals embedded in policy communication. Future policy revisions could benefit from a more deliberate balance between credibility-preserving neutrality and engagement-enhancing positive framing, particularly in domains where individual behavior is central to economic outcomes.

5. Conclusion

This study set out to examine an often-overlooked dimension of education and financial policy: the linguistic

characteristics of policy texts themselves and their potential economic implications. Focusing on Romania's SNECA and SNEF for the 2024–2030 period, the study applied two computational text-analysis tools – VADER sentiment analysis and the Gunning Fog readability index – to assess how tone and linguistic complexity may shape policy effectiveness. By embedding these results within established frameworks from the economics of education, institutional economics, and behavioral economics, the study contributes a novel perspective to the evaluation of human capital policies in emerging EU economies.

The findings of the readability analysis reveal that both strategies are characterized by exceptionally high levels of linguistic complexity. With Gunning Fog scores exceeding 20 in both cases, the documents fall within a range typically associated with postgraduate or expert-level texts (Gunning, 1952; DuBay, 2004). From an economic standpoint, such complexity implies high cognitive access costs for readers, particularly those with limited formal education. In the context of adult learning and financial education – policy domains explicitly aimed at inclusion and broad participation – this represents a significant tension between stated objectives and communicative execution.

The implications of high readability scores extend beyond mere comprehension. In human capital theory, participation in education is modeled as an investment decision under uncertainty, where individuals weigh expected returns against costs, including opportunity and information costs (Becker, 1964). Linguistic complexity increases these information costs, potentially discouraging participation even when expected returns are positive. In Romania, where adult participation in lifelong learning remains among the lowest in the EU, such barriers may reinforce existing inequalities in skill accumulation and labor-market outcomes.

The fact that the financial education strategy exhibits a higher Fog score than the adult education strategy is particularly noteworthy. Financial education policies are typically targeted at individuals who are financially vulnerable and informationally constrained. Behavioral and financial economics literature consistently shows that these groups benefit most from simplified, clearly framed communication (Lusardi & Mitchell, 2014; Thaler & Sunstein, 2008). The elevated complexity of the financial education strategy therefore raises concerns regarding its ability to effectively reach and influence its intended audience. From a macroeconomic perspective, limited uptake of financial education may weaken household financial resilience, reduce savings efficiency, and ultimately constrain broader economic stability and growth.

The sentiment analysis complements these findings by shedding light on the emotional and evaluative stance embedded in the policy texts. Both strategies are dominated by neutral sentiment, with relatively low proportions of positive and negative affect. This pattern is consistent with prior studies of institutional and policy communication, which find that formal documents tend to minimize emotional expression in order to preserve credibility and avoid reputational risk (Bholat et al., 2015; Hansen & McMahon, 2016). In institutional economics terms, neutrality can be interpreted as a signaling strategy aimed at demonstrating administrative seriousness and alignment with supranational governance norms (North, 1990).

However, the economic interpretation of sentiment neutrality is ambivalent. While neutral tone may enhance external credibility, it may also reduce salience and engagement among domestic audiences. Behavioral economics highlights that individuals do not respond to information in a purely rational manner; framing, emotional cues, and perceived relevance play a crucial role in shaping behavior (Kahneman, 2011). In policy domains that rely heavily on voluntary participation and individual decision-making, such as adult learning and financial education, excessively neutral language may fail to overcome inertia, present bias, or skepticism toward public institutions.

The slightly lower positive sentiment and marginally higher neutral sentiment observed in the financial education strategy further amplify these concerns. Financial behavior is particularly sensitive to trust, perceived self-efficacy, and motivation. If policy texts emphasize procedures, risks, and constraints without sufficiently highlighting achievable benefits, individuals may remain disengaged from formal financial systems. This has important implications for capital allocation, financial inclusion, and the effectiveness of monetary and fiscal policy, especially in economies with relatively low levels of financial literacy.

Taken together, the readability and sentiment results suggest that Romania's national strategies embody a communicative equilibrium characterized by high complexity and emotional restraint. From an economic perspective, this equilibrium may be rational when policies are designed primarily as coordination instruments among institutions or as signals to external actors, such as the European Commission or international organizations. However, when the same documents are also intended to inform and motivate citizens, the resulting trade-off may undermine policy effectiveness at the micro level.

One of the central contributions of this study is methodological. By applying computational text analysis tools to education and financial policy documents, the study demonstrates how linguistic features can be

operationalized and analyzed quantitatively. Readability and sentiment metrics provide transparent, replicable indicators that complement traditional policy evaluation approaches focused on funding, governance, and outcomes. Importantly, these tools allow for ex ante assessment of potential barriers to participation, rather than relying solely on ex post indicators such as enrollment rates or behavioral change.

The economic interpretation advanced in this study positions policy language as a form of institutional infrastructure. Just as physical and legal infrastructures shape economic behavior by altering incentives and constraints, linguistic infrastructure influences who can access, understand, and act upon public policies. High linguistic complexity functions as an implicit barrier, while emotional neutrality shapes expectations and engagement. Recognizing these mechanisms expands the analytical scope of the economics of education and highlights the importance of communication design as a policy variable in its own right.

Despite its contributions, the study is subject to several limitations that should be acknowledged. First, the analysis relies on English translations of Romanian policy documents. Although machine-assisted translation was necessary for compatibility with natural language processing tools, translation may alter sentence structure, word choice, and sentiment distribution. While previous research suggests that comparative patterns remain informative, absolute values should be interpreted with caution. Future studies could replicate the analysis using Romanian-language sentiment and readability tools as they become more robust and widely available.

Second, readability indices such as the Gunning Fog index provide only a partial measure of textual accessibility. They focus on sentence length and word complexity, but do not capture semantic coherence, conceptual familiarity, or document layout. Visual elements, examples, and explanatory structures may mitigate some of the barriers implied by high Fog scores. Combining readability analysis with user testing or experimental comprehension studies would provide a more comprehensive assessment.

Third, sentiment analysis using lexicon-based tools such as VADER has inherent limitations. While VADER is well-suited for general policy and social texts, it may not fully capture domain-specific meanings or subtle rhetorical strategies. Additionally, sentiment scores do not directly measure reader perceptions or emotional responses. Experimental or survey-based approaches could complement computational sentiment analysis by examining how different audiences actually interpret policy language.

Fourth, the study focuses on two national strategies within a single country. While Romania represents a particularly relevant case due to its low participation rates in adult learning and financial education, the findings may not be fully generalizable to other contexts. Cross-country comparative studies could examine whether similar patterns of complexity and neutrality are present in other EU member states and how these patterns relate to participation outcomes.

These limitations point to several promising avenues for future research. One direction involves extending the analysis to a broader set of countries and policy domains, enabling comparative assessments of linguistic accessibility and sentiment across institutional contexts. Another avenue involves integrating text analysis with econometric models that link linguistic features to participation rates, program uptake, or behavioral outcomes. Such approaches would allow researchers to estimate the marginal impact of readability and sentiment on policy effectiveness.

Future research could also explore dynamic aspects of policy communication, examining how language evolves across policy cycles and whether revisions reflect learning from previous outcomes. Experimental studies could test alternative versions of policy texts with varying levels of complexity and sentiment to assess their causal effects on comprehension, trust, and intention to participate.

In conclusion, this study argues that policy effectiveness in adult education and financial literacy cannot be fully understood without attention to language. By bringing computational text analysis into the economics of education and policy evaluation, the study highlights the role of readability and sentiment as economically meaningful variables. The findings suggest that Romania's national strategies, while ambitious and well-aligned with European priorities, may benefit from greater attention to linguistic accessibility and motivational framing. Addressing these dimensions could enhance participation, improve returns on public investment, and strengthen the role of human capital in supporting long-term economic development.

Funding information

Author states no funding involved.

Author contribution

The author confirms sole responsibility for all aspects of this work, including conceptualization, research design, data collection, analysis, interpretation of results, and

manuscript preparation. The author has read and approved the final version of the manuscript.

Conflict of interest statement

Author states no conflict of interest.

References

Acemoglu, D., & Autor, D. (2011). Skills, tasks and technologies: Implications for employment and earnings. *Handbook of Labor Economics*, *4*(Part B), 1043–1171. doi: 10.1016/S0169-7218(11)02410-5.

Aghion, P., & Howitt, P. (2009). *The economics of growth*. MIT Press.

Barberis, N. (2018). Psychology-based models of asset prices and trading volume. *Handbook of Behavioral Economics*, *1*, 79–175. doi: 10.1016/bs.hesbe.2018.07.001.

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago Press.

Bholat, D., Hansen, S., Santos, P., & Schonhardt-Bailey, C. (2015). *Text mining for central banks. Centre for Central Banking Studies Handbook No. 33*. Bank of England.

Campos, N. F., & Coricelli, F. (2002). Growth in transition: What we know, what we don't, and what we should. *Journal of Economic Literature*, *40*(3), 793–836. doi: 10.1257/002205102760273788.

CEDEFOP. (2020). *Empowering adults through upskilling and reskilling pathways*. Publications Office of the European Union. https://www.cedefop.europa.eu.

Desjardins, R. (2017). *Political economy of adult learning systems: Comparative study of strategies, policies and constraints*. Bloomsbury Academic.

DuBay, W. H. (2004). *The principles of readability*. Impact Information.

Eurostat. (2022). *Adult participation in learning*. European Commission.

Fernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial literacy, financial education, and downstream financial behaviors. *Management Science*, *60*(8), 1861–1883. doi: 10.1287/mnsc.2013.1849.

Gunning, R. (1952). *The technique of clear writing*. McGraw–Hill.

Hansen, S., & McMahon, M. (2016). Shocking language: Understanding the macroeconomic effects of central bank communication. *Journal of International Economics*, *99*, S114–S133. doi: 10.1016/j.jinteco.2015.12.008.

Hanushek, E. A., & Woessmann, L. (2015). *The knowledge capital of nations: Education and the economics of growth*. MIT Press.

Hutto, C. J., & Gilbert, E. (2014). VADER: A parsimonious rule-based model for sentiment analysis of social media text. *Proceedings of the Eighth International AAAI Conference on Weblogs and Social Media*, (pp. 216–225).

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.

Kaiser, T., & Menkhoff, L. (2017). Does financial education impact financial literacy and financial behavior? *World Bank Economic Review*, *31*(3), 611–643. doi: 10.1093/wber/lhx009.

Loughran, T., & McDonald, B. (2014). Measuring readability in financial disclosures. *Journal of Finance*, *69*(4), 1643–1671. doi: 10.1111/jofi.12162.

Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy. *Journal of Economic Literature*, *52*(1), 5–44. doi: 10.1257/jel.52.1.5.

Lusardi, A., & Mitchell, O. S. (2017). How ordinary consumers make complex economic decisions. *American Economic Review*, *107*(5), 151–155. doi: 10.1257/aer.p20171033.

Lusardi, A., Samek, A., Kapteyn, A., Glinert, L., & Hung, A. (2017). Visual tools and narratives: New ways to improve financial literacy. *Journal of Pension Economics & Finance*, *16*(3), 297–323. doi: 10.1017/S1474747216000323.

North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge University Press.

OECD. (2016). *OECD/INFE international survey of adult financial literacy competencies*. OECD Publishing.

OECD. (2019). *Getting skills right: Future-ready adult learning systems*. OECD Publishing.

OECD. (2020). *OECD skills outlook 2020: Thriving in a digital world*. OECD Publishing.

PLAIN Language Action and Information Network. (2011). *Federal plain language guidelines*. https://plainlanguage.gov.

Spence, M. (1973). Job market signaling. *Quarterly Journal of Economics*, *87*(3), 355–374. doi: 10.2307/1882010.

Stiglitz, J. E. (2000). The contributions of the economics of information to twentieth century economics. *Quarterly Journal of Economics*, *115*(4), 1441–1478. doi: 10.1162/003355300555015.

Sweller, J. (1988). Cognitive load during problem solving. *Cognitive Science*, *12*(2), 257–285. doi: 10.1207/s15516709cog1202_4.

Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.