

Beyond Parallel Domains: An Asymmetric Ecological Framework for AI-Mediated EFL in Saudi Arabia

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Abstract

English language education in Saudi Arabia is undergoing transforming amid broader economic, educational, and technological reforms. English plays an important role in higher education, professional development, internationalization, and participation in the knowledge-based economy, while young Saudis increasingly engage with English through social media, entertainment, gaming, and digital communication. Generative AI is also reshaping how learners access, produce, practice, and evaluate language. However, Saudi EFL research often treats language policy, classroom practice, learner attitudes, and technology as separate domains, potentially obscuring their dynamic interactions. Drawing on language policy and planning, language ecology, human-capital perspectives, and sociocultural approaches, this conceptual article proposes the Saudi EFL Ecological Transformation Framework (SEETF). The framework conceptualizes Saudi EFL as a dynamic ecology shaped by three interacting forces: language policy, economic transformation, and youth language practices, with generative AI functioning as a cross-cutting mediating force that alters the speed, visibility, and form of these interactions. It emphasizes policy enactment, learner agency, informal language practices, and asymmetries in influence and in the pace of change across institutional and societal contexts. The article advances seven conceptual propositions and argues that the future of Saudi EFL depends not on expanding English instruction but on coordinating these forces across differing timescales and degrees of institutional control.

Keywords: Saudi Arabia; English as a foreign language; language policy; language ecology; youth; generative artificial intelligence; Vision 2030; language education

1. Introduction

English language education has played an important role in Saudi Arabia for several decades, particularly in secondary and higher education and in fields such as science, technology, medicine, business, and international communication. The significance of English, however, cannot be understood solely through the traditional lens of foreign-language instruction. Recent social, economic, and technological changes in Saudi Arabia are reshaping the purposes, contexts, and modes through which English is learned and used. Saudi Arabia's Vision 2030 agenda emphasizes human-capital development, educational quality, digital transformation, economic diversification, and greater participation in global economic and cultural networks (Kingdom of Saudi Arabia, 2016). These developments create a context in which English may function not merely as a curriculum subject but also as a resource associated with educational mobility, professional participation, international communication, and access to global knowledge.

At the same time, the linguistic lives of Saudi youth are no longer confined to classrooms. Digital media, gaming, social networking, entertainment platforms, and globally circulating popular culture have expanded the spaces in which English can be encountered and used. Such developments complicate traditional distinctions between formal and informal language learning. A learner may study English through a prescribed curriculum while simultaneously developing vocabulary, pragmatic knowledge, reading habits, and communicative confidence through activities outside formal education. These informal engagements may contribute to language development even when they are not institutionally recognized as language learning. These informal practices often evolve faster than the institutions meant to recognize them. This temporal mismatch is important to the ecological perspective developed in this article. From a sociocultural perspective, this suggests that English learning needs should be examined in relation to the broader social practices through which learners participate in increasingly networked communicative environments (Norton, 2013; Pennycook, 2010; Suhono et al., 2025; Yuan et al., 2019).

A further shift is associated with the emergence of generative artificial intelligence. The rapid development of systems capable of producing, translating, explaining, evaluating, and interacting in natural language has created new possibilities for language learning. Generative AI can provide learners with immediate feedback, conversational practice, explanations, examples, reformulations, and personalized forms of support. However, it also raises substantial questions concerning academic integrity, assessment validity, learner autonomy, privacy, digital inequality, authorship, and the changing professional role of teachers (Kasneci et al., 2023; Miranty et al., 2026; Tlili et al., 2023). Consequently, AI should therefore be understood neither as another technological tool added to an existing EFL system nor as a separate fourth dimension alongside policy, economic change, and youth practice. Its implications are systemic rather than additive. AI does not operate independently within the Saudi EFL system. Rather, it increasingly mediates, accelerates, and reshapes how policy, economic demand, and youth practice influence learners, teachers, language resources, knowledge, and assessment.

These developments reveal a conceptual limitation in existing approaches to Saudi EFL. Language policy is often examined in terms of governmental decisions and curriculum implementation. The relationship between English and economic development is frequently addressed through employability and human-capital perspectives. Youth language practices are commonly explored through identity, motivation, and digital participation. Educational technology research, meanwhile, has frequently focused on technology acceptance, adoption, implementation, and effectiveness, with technology-acceptance frameworks such as the Technology Acceptance Model (TAM) remaining particularly prominent (Granić, 2022; Oyetade et al., 2020). Although these perspectives provide valuable insights, their tendency to examine individual dimensions in isolation can obscure the relationships that connect them. Treating policy, economic change, youth language practice, and technological development as relatively separate areas of inquiry makes it difficult to account for the ways in which developments in one dimension may influence, constrain, or accelerate processes unfolding in the others.

This article therefore proposes an ecological conceptualization of Saudi EFL. Its central argument is that English education in contemporary Saudi Arabia should be understood as a dynamic linguistic ecology. In this ecology, language policy, economic transformation, and youth language practice constitute three interacting forces that operate through educational institutions, teachers, learners, curriculum, pedagogy, and assessment. Generative AI runs through these interactions as a cross-cutting force that can intensify and make more visible processes already occurring within the ecology. These interactions are neither uniform nor symmetrical: some components, such as national policy, exert more direct and immediate influence, whereas others, such as youth practice, may shift more rapidly than the institutions expected to respond to them. The article develops this argument by drawing on language-policy scholarship, language-ecology perspectives, human-capital theory, sociocultural approaches to language learning, and emerging research on generative AI in education. It then introduces the Saudi EFL Ecological Transformation Framework (SEETF) and proposes seven propositions to guide future theoretical and empirical research.

2. From Language Policy to Policy Enactment

Language policy has traditionally focused on deliberate efforts to influence language practices, language status, and language learning. Classic language-policy scholarship demonstrates, however, that policy cannot be reduced to official documents or governmental declarations. Spolsky (2004) conceptualizes language policy through the interaction of language practices, language beliefs or ideologies, and explicit language-management efforts. Similarly, Shohamy (2006) argues that language policy frequently operates through mechanisms that extend beyond formally declared policy and that actual language practices may differ substantially from official intentions. These perspectives are particularly relevant to EFL because educational policy is ultimately enacted through the actions and interpretations of institutions and individuals rather than implemented mechanically.

Johnson (2013) further develops this position by conceptualizing language policy as a process involving multiple agents, practices, and contexts. From this perspective, policy is not created

by governments and implemented by teachers. Teachers interpret policy, institutions mediate it, learners respond to it, and communities may reproduce, negotiate, or resist it. Empirical evidence from diverse settings supports this process-oriented view. For example, Zagoto et al.'s (2025) systematic review of English-medium instruction policy implementation finds that gaps between policy and practice recur across educational contexts. These findings reinforce the view that policy outcomes depend substantially on local enactment rather than on policy text alone. A national commitment to English education does not, therefore, determine how English is taught, how learners value it, or how English is used beyond educational institutions.

This process-oriented perspective is particularly relevant to Saudi Arabia, where educational reforms are unfolding alongside rapid economic and technological change, expanding international engagement, and substantial growth in digitally connected youth populations. The significance of English cannot be inferred merely from curriculum documents or formal policy statements. Its meanings and uses may vary among policymakers, university administrators, teachers, students, employers, and families, reflecting differences in their interests, experiences, and social contexts. Understanding English education in contemporary Saudi Arabia thus requires attention not only to formal policy but also to the social practices and contexts through which policy is interpreted, negotiated, and enacted.

Research in the Saudi context provides evidence that these differences in perspective can create tensions between national educational ambitions and local understandings of English. For example, teachers may view English as important for academic success and the objectives of Vision 2030, while cultural and socioeconomic factors can influence students' perceptions of its value (Alghuwainem, 2025). Similarly, concerns about local conditions, the Arabic language, and cultural identity suggest that English-language policy cannot be separated from the wider sociocultural context in which it operates (Barnawi & Al-Hawsawi, 2017). A policy perspective focused primarily on formal decision-making therefore risks overlooking these differences and the processes through which they shape policy in practice.

The ecological approach proposed in this article consequently shifts attention from policy implementation to policy enactment. Implementation-oriented perspectives often emphasize the movement from policy decisions to institutional practice, whereas enactment highlights interpretation, negotiation, adaptation, and agency. This distinction is particularly relevant to the Saudi higher education context, where English-language policies may take different forms across institutions. Alnasser and Almoaily (2022), for instance, found that Saudi university English departments may operate without formal language policies or implement them with considerable flexibility. Such findings suggest that institutional actors interpret and adapt policy according to their institutional circumstances rather than applying it as prescribed. Case-based evidence at other levels points in the same direction. In the preparatory-year program of one Saudi university, EFL teachers were uncertain about a policy prohibiting first-language use and did not apply it consistently (Alomaim, 2019). A later survey at one university found that teachers and students reported using Arabic in distance-learning classes and gave differing accounts of what the departmental policy required (Alomaim, 2024). At school level, a questionnaire study of the 2021 policy of teaching English from Grade 1 reported teacher concerns about training and curriculum suitability (Jabeen, 2023). These studies are small and

context-specific, but they are consistent with the view that policy is interpreted and adapted in practice. This does not diminish the importance of national policy. Instead, it places policy within a larger system in which institutional actors and learners participate in shaping what policy becomes in practice.

This conceptualization also makes it possible to understand policy feedback, although this feedback is asymmetric in strength and direction. Policy can shape institutional practice relatively directly and quickly through mechanisms such as curriculum mandates and assessment requirements. By contrast, institutional and learner experiences may influence policy more indirectly and gradually through accreditation processes, aggregated outcome data, and changing stakeholder perceptions. These feedback mechanisms may not provide formal or immediate channels through which these gaps are communicated to policymakers. The tensions between national ambitions, local cultural considerations, and stakeholder perceptions (Alghuwainem, 2025; Barnawi & Al-Hawsawi, 2017) illustrate how such divergences can persist without prompting formal policy revision. The flexibility with which policies are enacted across institutions provides a further indication of this dynamic (Alnasser & Almoaily, 2022). Policy therefore operates within an asymmetric feedback system rather than at the top of a fixed hierarchy: the feedback pathway from institutional and learner experience to policy is generally slower and less direct than the pathway from policy to institutional practice. The framework developed later in this article treats this asymmetry as a structural feature of the Saudi EFL ecology rather than as an incidental gap to be closed.

3. English, Human Capital, and Economic Transformation

The relationship between language and economic development has often been examined through human-capital theory. Becker (1993) conceptualizes education and skills as forms of human capital that can contribute to productivity and economic participation. In language education, this perspective has encouraged scholars to examine language proficiency as a form of human capital that can facilitate access to employment, international markets, professional networks, and educational opportunities. English is particularly relevant to these discussions because of its extensive use in international science, business, higher education, technology, and professional communication. From this perspective, English proficiency can constitute a valuable resource for individuals seeking to participate in increasingly internationalized educational and professional environments.

Nevertheless, an overly instrumental account of English can be problematic. English proficiency should not automatically be treated as a direct cause of economic growth. Rather, its economic value depends on the opportunities and institutional structures through which linguistic skills can be mobilized. Al-Seghayer (2026), in proposing a strategic human-capital alignment framework for English-language capability and economic diversification in Saudi Arabia, highlights the importance of examining English proficiency in relation to wider economic objectives and the conditions under which language capabilities may support economic participation. This perspective reinforces the argument that the relationship between English and economic transformation is mediated by broader social, economic, technological, and political structures. English may facilitate participation in particular economic activities

without independently producing economic growth.

This distinction is important for understanding the implications of Saudi Arabia's Vision 2030. The national transformation agenda emphasizes economic diversification, human-capital development, private-sector growth, technological innovation, and greater integration with international economic and cultural environments (Kingdom of Saudi Arabia, 2016). These priorities potentially increase the relevance of English in sectors where international communication, technical knowledge, tourism, finance, technology, and cross-border collaboration are important. Recent research identifies substantial alignment between English-language education and the economic objectives of Vision 2030, although this alignment is accompanied by challenges, including sociocultural barriers and limitations in teacher preparedness (Albaqami et al., 2026). At the same time, questions remain about whether existing levels of EFL competence are sufficient to support the broader ambitions associated with Vision 2030 associated with Vision 2030 (Al-Mwzaiji & Muhammad, 2023). The resulting demand for English should not, however, be interpreted as a requirement for more hours of conventional EFL instruction.

Instead, economic change requires reconsideration of what English competence means. A graduate entering an increasingly internationalized workplace may need disciplinary vocabulary, digital communication skills, intercultural competence, presentation skills, collaborative abilities, information literacy, and the ability to participate effectively in technology-mediated environments. Al-Seghayer's (2026) strategic human-capital alignment perspective provides a relevant conceptual basis for considering English-language capability in relation to Saudi Arabia's economic diversification objectives. This broader perspective suggests that English proficiency should be understood not merely as general linguistic knowledge but also in relation to the communicative capabilities required for participation in specific professional, educational, and economic contexts. This shift is also reflected in proposals for AI-enhanced English for Specific Purposes (ESP), which seek to develop professional communication skills aligned with workforce-development objectives associated with Vision 2030 (Shafi, 2026). In this context, generative AI is best understood not as a separate technological development but as a channel through which economic demand can reshape English pedagogy.

The conceptual implication is that curriculum development should not merely respond to labour-market demand by adding more English content. Instead, curriculum design should consider how English functions within broader professional, digital, and disciplinary practices. This requires greater attention to the purposes for which learners are expected to use English and to the communicative competencies required in emerging workplaces. Such an orientation moves EFL away from an isolated subject model toward an understanding of language as a component of human-capital development. Al-Seghayer's (2026) framework complements the present ecological perspective by foregrounding the relationship between English-language capability and economic diversification. Whereas the strategic human-capital perspective helps explain why English-language capabilities may matter to national economic objectives, the Saudi EFL Ecological Transformation Framework (SEETF) situates those capabilities within a wider system of policy enactment, institutional practice, youth language activity, and

technological mediation.

This relationship is also asymmetric and operates at different speeds in each direction. Labor-market demand can reshape curriculum priorities relatively quickly, particularly when institutions respond to emerging sector needs and employability signals. By contrast, the reverse process, through which English education contributes to economic transformation through human-capital development, unfolds over a longer, cohort-based timescale as successive groups of graduates enter the workforce. This asymmetry has important implications for evaluating curriculum responsiveness. Institutions may reasonably review curriculum priorities at a pace that reflects changes in labor-market demand, but evidence of broader economic effects should not be expected within the same timeframe. The economic relevance of English should therefore not be evaluated by the quantity of instruction provided or by the speed with which economic effects become visible. Instead, it should be assessed in relation to the extent to which English education enables learners to participate meaningfully in the professional, technological, and international environments associated with economic change.

4. Young Saudis and Changing English Language Ecologies

Language ecology provides a useful framework for understanding the relationship between language, speakers, social environments, and communicative practices. Haugen's (1972) early ecological approach directed attention to languages as embedded within broader social environments rather than as isolated linguistic systems. More recent sociolinguistic work has extended ecological thinking to multilingualism, mobility, identity, and digitally mediated communication. This perspective is particularly relevant to the Saudi context, where young people's encounters with English increasingly extend beyond formal educational settings.

For young people, this ecological perspective is especially important because contemporary language practices frequently cross institutional boundaries. English may be encountered through YouTube videos, online games, social media, streaming services, music, software interfaces, international educational resources, and online communities. These environments provide opportunities for learners to encounter and use English in ways that are not necessarily organized around formal language-learning objectives.

Research on Saudi EFL learners indicates that internet-based informal learning can provide important opportunities for English development, with activities such as posting, commenting, sharing, and participating in virtual communities creating learning experiences outside formal classroom instruction (Alqarni, 2020). Such practices can create highly individualized forms of language development that are difficult for formal educational institutions to monitor or control.

Learners may therefore construct their own English-learning environments through everyday digital participation, adopting new platforms, genres, and communicative conventions before institutions become aware of them or are able to respond. At the same time, access to informal English use is not uniform: community, cultural, religious, and other contextual factors can shape the opportunities available to Saudi learners for using and practicing English outside the

classroom (Alrabai, 2018). From an ecological perspective, such practices suggest that young people are not consumers of English provided through formal education; they may also select, adapt, and circulate language resources across digital platforms and communicative communities, potentially contributing to emerging patterns of English use beyond institutional expectations.

This unevenness has implications that go beyond inequality of access alone. Because informal digital practices may change faster than curricula, materials, and teacher training can be revised, unequal access to these practices may do more than reproduce existing inequalities; it may also influence which learners' English use diverges earliest and most persistently from what is formally taught. This is, admittedly, an inference rather than a directly evidenced finding: to my knowledge, no study has yet measured the relative rates of change between youth digital practice and institutional provision in the Saudi context. I therefore treat this asymmetry in the rate of change, rather than a fixed gap in content, as the central dynamic organizing the discussion that follows. Under these conditions, the distinction between learning English and using English to participate in other activities becomes increasingly blurred, even as the forms and extent of informal language learning remain socially and contextually situated.

The concept of investment developed by Norton (2013) is relevant here because it highlights the relationship between language learning, identity, and access to desired social worlds. Learners invest in language not merely because they are instructed to do so but because language can provide access to identities, communities, relationships, educational opportunities, and imagined futures. This is particularly significant in contexts where English is associated with educational and economic opportunities: research among Saudi learners indicates positive attitudes toward English and an understanding of its importance for employment and economic opportunity (Alotaibi & Abahussain, 2024). Digital environments can therefore make English meaningful in ways that extend beyond formal curriculum objectives and connect language learning with learners' aspirations, identities, and imagined futures. However, the specific ways in which digital investment in English shapes these aspirations, rather than positive attitudes toward English more generally, remain underexplored.

One consequence of the speed asymmetry described above is that educational institutions may find themselves teaching forms of English, registers, genre conventions, and digital literacies that no longer correspond closely to the communicative experiences of their students by the time curricula catch up. Alanazi's (2025) account of tensions between established pedagogical practices and more socioculturally responsive approaches can be read as one institutional symptom of this lag: formal provision may struggle to keep pace with practices that are themselves still forming.

Read this way, the Saudi EFL ecology is defined less by a static gap between policy and practice than by an ongoing asymmetry in tempo: how quickly institutions can register and respond to practices that are themselves still forming.

This reframes young people not merely as recipients of language policy but as active participants in the production and transformation of linguistic practices, whose everyday communicative choices can interact with institutional expectations and curriculum priorities,

potentially creating pressure for changes in curriculum, pedagogy, teacher development, and assessment. Institutional responses may therefore lag behind the practices that prompt them; the more consequential question is whether institutions treat that lag as evidence of changing communicative needs to be tracked and anticipated, or simply as a gap to be periodically closed. Understanding English-language education in Saudi Arabia therefore requires attention not only to what policies prescribe or what classrooms provide, but also to how quickly and unevenly young people encounter, use, and assign meaning to English across the wider social and digital environments in which their lives unfold. Youth language practice is, in this sense, not merely an outcome of the educational system; it is also a force through which the wider ecology continues to change.

5. Generative AI and the Transformation of EFL

The emergence of generative AI introduces a further shift into this ecology. However, consistent with the argument developed throughout this article, its significance lies less in constituting a fourth independent force than in altering the speed, visibility, and form through which the three dimensions already discussed interact. Unlike earlier educational technologies that primarily delivered predetermined content, generative AI can interact dynamically with learners and produce new linguistic material. Large language models can generate explanations, examples, dialogues, summaries, translations, corrections, and alternative formulations, creating possibilities for highly accessible and individualized interaction.

Recent scholarship has consequently begun to examine generative AI as a potentially transformative educational technology, although much of this literature addresses education in general rather than Saudi EFL specifically. Kasneci et al. (2023) identify significant educational opportunities associated with large language models while also emphasizing concerns related to accuracy, bias, assessment, and academic integrity. Tlili et al. (2023) similarly argue that generative AI creates both opportunities and challenges for education and that institutions need to consider its implications beyond simple technology adoption. The discussion here extends this general literature through the SEETF framework developed above. Where specific Saudi EFL evidence is not yet available, the argument should therefore be understood as an extrapolation from the ecology model rather than as an established empirical finding.

AI's mediating role can be traced across each of the three dimensions discussed above rather than treated as a separate concern layered on top of them, although the extent of this mediation varies and is easier to establish for some dimensions than others.

In relation to economic transformation, the Saudi-specific claim is comparatively better supported. AI-enhanced approaches to English for Specific Purposes are being proposed as a means of addressing workforce-development objectives associated with Vision 2030 (Shafi, 2026), suggesting that AI can accelerate rather than replace the demand-side pressures on curriculum described in Section 3.

In relation to youth practice, the claim is more inferential. Learners may increasingly incorporate generative AI into informal English use by requesting explanations, rehearsing conversations, generating alternative phrasing, and obtaining feedback. While this pattern is

consistent with the broader tendency for informal digital practices to outpace formal institutional recognition, its extent among Saudi learners remains insufficiently documented. Small-scale Saudi studies document learner use and perceptions of generative tools such as ChatGPT, Grammarly, and QuillBot among 317 students at one university (Almohammadi, 2025), and high awareness alongside moderate use among 30 university students (Aljabr, 2023). These studies describe perceptions and patterns of use at a single point in time. They do not establish when such use emerged relative to institutional guidance, so the timing assumed by the framework remains untested.

In relation to language policy, AI raises an enactment problem similar to that identified in Section 2. Institutional responses may vary in how emerging AI-related policies and guidelines are interpreted and applied, creating another context in which policy intentions and institutional practices can diverge. Evidence from Saudi university EFL instructors is suggestive: a mixed-methods study of 101 instructors found selective use concentrated on preparatory tasks, avoidance of use in assessment, and a reported absence of clear institutional guidance (Alderaan, 2026).

In EFL specifically, generative AI has considerable potential because language learning depends heavily on interaction, feedback, modelling, practice, and opportunities for meaningful communication. Generative AI systems can provide forms of interaction that may previously have been constrained by classroom time and teacher availability, allowing learners to request explanations, practice conversations, obtain feedback on drafts, and experiment with different forms of communication on demand. These possibilities may expand access to language practice while also changing the relationship between learners, teachers, and linguistic resources.

Yet these same characteristics create pedagogical challenges that mirror the speed asymmetry running through this article's broader argument. If AI systems can produce polished essays, students may bypass important stages of language development faster than instructors can identify and address the gap. If learners rely on automated correction without understanding the underlying linguistic principles, apparent accuracy may conceal limited competence in ways that are not immediately visible to teachers working within existing assessment routines. AI-generated output may also contain factual or linguistic errors, reproduce biases, or privilege dominant varieties of English. Critical evaluation must therefore become an essential component of AI-supported language learning, particularly where institutional assessment practices may not yet be designed to distinguish genuine linguistic development from increasingly sophisticated AI-assisted production. Here, the more pressing constraint is not the technology itself but the institutional capacity to notice and respond to its effects.

The central question for Saudi EFL is therefore not simply how AI should be permitted, restricted, or incorporated, but how its effects are already interacting with policy, economic demand, and youth language practices. Treating AI as an external variable that can be regulated independently of these processes overlooks the ways in which its use is distributed across the wider ecology, regardless of formal institutional positions. Consistent with the temporal framing developed in this article, a more productive question concerns how quickly institutions

can develop the capacity to respond to AI-mediated changes while maintaining human agency, teacher expertise, learner development, and ethical responsibility at the center of language education.

This requires corresponding changes in assessment, where the implications of AI for policy enactment become particularly concrete. If assessment continues to measure primarily the production of texts that can readily be generated by AI, the validity of some assessment practices may become increasingly difficult to sustain. Because assessment is also a principal mechanism through which policy shapes institutional practice, as established in Section 2, this is not merely a pedagogical problem but a problem of policy enactment. Institutions may therefore need to consider greater emphasis on process, oral interaction, reflective explanation, in-class performance, iterative drafting, and the critical evaluation of AI-generated content. AI literacy consequently becomes increasingly connected to language literacy.

At the same time, assessment redesign illustrates the broader influence of AI within the SEETF. Rather than constituting a new element of the ecology, AI can accelerate and reshape existing relationships among policy, institutional practice, economic demand, and youth language practices. Its significance for Saudi EFL therefore depends not only on what the technology can do, but also on how quickly institutions can recognize its effects, develop appropriate responses, and maintain the centrality of human learning within a rapidly changing language-learning ecology.

6. Why an Ecological Framework Is Needed

The preceding discussion reveals a common limitation across the relevant bodies of scholarship. Language-policy research explains how language decisions are formulated and enacted; economic perspectives explain why particular language skills may acquire social and professional value; youth-language research demonstrates how linguistic practices extend beyond formal education; and AI research identifies new technological possibilities and risks. What remains insufficiently conceptualized is the relationship among these processes within the broader transformation of Saudi EFL.

A conventional linear model might represent these relationships as shown in the upper panel of Figure 1:

National policy → educational institutions → teachers → learners → economic outcomes.

Such a model assumes that policy flows downward, that learners occupy the endpoint of the process, and that the components exert influence of roughly comparable weight and speed. All three assumptions are problematic. Policy does not flow downward: institutional actors reinterpret mandates in practice, while learner behavior can contribute to pressure for policy revision. Learners are not an endpoint: their informal digital practices may emerge ahead of and outpace what institutions formalize. Influence is also not evenly distributed. National policy carries regulatory authority that youth practice does not, while youth practice can shift more rapidly than policy can respond. A model that treats these relationships as symmetrical and operating at similar speeds therefore remains insufficient for representing the dynamics described here.

The framework proposed here retains the core insight that these relationships are reciprocal rather than one-directional, but it specifies how and at what pace that reciprocity operates rather than assuming that everything affects everything else equally. This distinction is illustrated in the lower panel of Figure 1. The framework is a conceptual model rather than an empirically calibrated one: the specific timescales and directional asymmetries described below are intended as illustrations of the ecology's structure, consistent with the arguments developed in the preceding sections, rather than as measured quantities. Three refinements distinguish the proposed framework from a simple reciprocal model.

First, the relationships are asymmetric in strength and direction. Language policy can shape institutional practice relatively directly through curriculum mandates, assessment requirements, and other regulatory mechanisms. Institutions and learners, in turn, influence policy more indirectly through implementation gaps, accreditation pressures, aggregated outcome data, stakeholder perceptions, and other forms of feedback that may eventually reach policymakers. The feedback loop therefore exists, but it operates more slowly and with less direct institutional force in one direction than in the other. A comparable asymmetry may characterize the relationship between economic transformation and educational provision: labor-market demand can reshape curriculum priorities within relatively short planning or funding cycles, whereas educational provision may influence the labor market only over considerably longer periods, as successive cohorts of graduates enter the workforce. This latter claim draws on the general logic of curriculum-to-labor-market lag rather than on Saudi-specific data, and would benefit from empirical grounding in future work.

Second, AI is not an independent dimension parallel to policy, economic transformation, and youth language practice. It functions as a cross-cutting mechanism through which these forces are increasingly expressed and reshaped. Policy influences AI through regulation and institutional guidance, including decisions concerning its use in assessment. Economic transformation interacts with AI by accelerating demand for graduates who can work effectively in AI-mediated professional environments. Youth practice may interact with AI as learners increasingly use generative tools informally, potentially ahead of institutional guidance or formal adoption, consistent with the broader pattern discussed in the previous section. Treating AI as a co-equal node alongside policy, economic transformation, and youth practice risks double-counting: some effects attributed to AI may be more accurately understood as policy, economic, or youth-practice influences operating through an additional technological channel. Figure 2 therefore positions AI as a cross-cutting mediating force rather than as a peer node, reflecting this revised conceptualization.

Third, the system operates on different timescales. As a stylized illustration of this structural point rather than a set of empirically estimated timescales, policy shifts may occur through multi-year planning and reform cycles; economic signals may emerge over periods ranging from months to several years; and youth digital practices and AI adoption may change within a single academic term or faster. A model that does not distinguish these timescales cannot adequately explain why formal educational provision may lag behind lived practice. This lag should not necessarily be interpreted as a failure of the system. Rather, it is a structural feature of an ecology in which different components operate under different institutional capacities,

incentives, and constraints. The resulting temporal asymmetry helps explain why institutional adaptation may occur only after significant changes have already taken place in youth practice, technology, or economic demand, and it is this asymmetry, rather than any single force in isolation, that the framework is intended to make visible.

Within this framework, digital language practices are treated as an important context through which youth language practices increasingly occur rather than as a separate dimension of ecology. Digital platforms provide environments in which learners encounter, use, adapt, and circulate English outside formal educational settings. Their inclusion in the framework therefore reflects the growing importance of digitally mediated communication without expanding the model beyond its three principal dimensions.

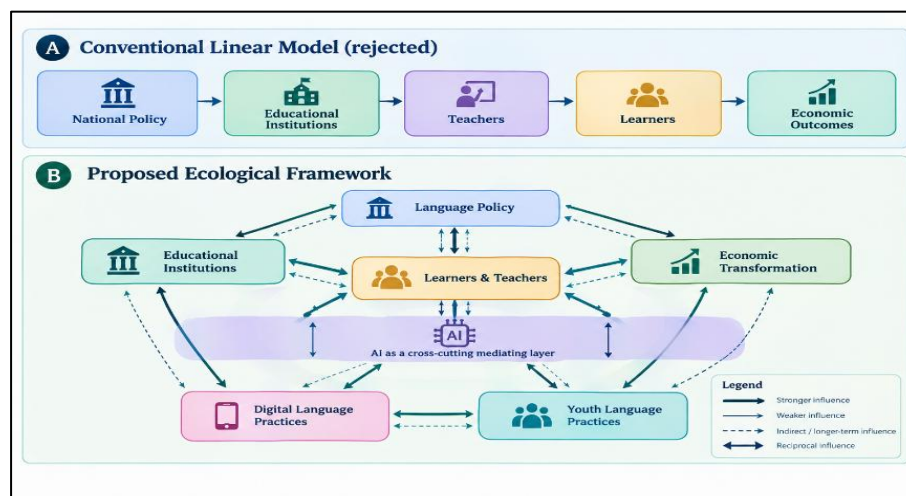


Figure 1. Conceptual transition from a conventional linear model to the Saudi EFL ecological framework

Note. Panel A depicts a one-directional policy-to-outcomes model. Panel B represents reciprocal and asymmetric relationships among language policy, educational institutions, educational actors, economic transformation, and youth language practices. Digital language practices are treated as a context of youth language practice rather than as a separate dimension. Generative AI is positioned as a cross-cutting mediating layer rather than a fourth independent dimension. Arrow styles indicate theorized differences in influence, reciprocity, and temporal character rather than empirically estimated effect sizes.

7. The Saudi EFL Ecological Transformation Framework

The Saudi EFL Ecological Transformation Framework (SEETF), shown in Figure 2, conceptualizes contemporary Saudi EFL as an ecology shaped by three interacting dimensions: language policy, economic transformation, and youth language practice. These dimensions operate through an educational environment comprising institutions, curriculum, pedagogy, and assessment, while generative AI functions as a cross-cutting mediating layer rather than as a fourth independent dimension.

Language policy provides the formal regulatory and ideological environment in which EFL

operates. It can shape institutional practice with comparatively high regulatory authority and, in some contexts, relatively quickly through curriculum mandates, assessment frameworks, and other regulatory mechanisms. Feedback from institutions and learners to policy is generally slower and less direct, occurring through implementation evidence, accreditation processes, stakeholder perceptions, and public discourse. Policy therefore exerts relatively direct influence on educational practice while receiving feedback through more indirect channels.

Economic transformation shapes the perceived purposes and value of English by generating changing demand for linguistic, professional, and digital competencies. This demand can influence curriculum priorities relatively quickly, particularly where institutions respond to employability indicators and emerging sector needs. The reverse channel, through which educational provision contributes to economic transformation through human-capital development, plausibly operates on a longer, cohort-based timescale as successive groups of graduates enter the workforce. The framework therefore conceptualizes economic transformation as influencing EFL provision more rapidly than EFL provision is expected to produce observable effects on the wider economy, although this directional asymmetry follows from the framework's general logic rather than from Saudi-specific measurement.

Youth language practice represents the informal and increasingly digitally mediated environments in which English is encountered and used outside formal instruction. Unlike policy and economic transformation, youth practice exerts influence primarily from the bottom up. It does not compel institutional change directly, but it can generate new forms of language use and create visible differences between what institutions teach and what learners already do. These differences may, in turn, create pressure for institutional and policy adaptation. Within the framework, youth language practice is conceptualized as the fastest-moving of the three dimensions and therefore as the component most likely to develop ahead of formal institutional recognition. This ordering is a structural claim of the model rather than a directly measured comparison.

Generative AI operates differently from the three dimensions above. As Figure 2 depicts through the dashed band surrounding the center of the framework, AI functions as a cross-cutting mediating layer through which each dimension is increasingly enacted and reshaped. Policy influences AI through decisions concerning its use in assessment, academic integrity, and permitted educational tools. Economic transformation may increase demand for graduates with AI-related competencies and thereby raise the importance of AI-related curriculum and policy decisions. For instance, AI-enhanced approaches to English for Specific Purposes proposed in connection with Vision 2030 workforce objectives illustrate this channel concretely. Youth practice, meanwhile, may already incorporate generative AI tools informally, potentially ahead of institutional guidance, although direct evidence of this among Saudi learners remains limited. AI's significance within SEETF therefore lies less in its operation as an isolated technological development than in how it alters the speed, visibility, and form of interactions among the three primary dimensions. For example, generative AI can make differences between informal youth practice and formal curriculum more visible to teachers and policymakers, potentially accelerating institutional responses.

At the center of the framework are learners and teachers. Learners are conceptualized as agents who navigate multiple linguistic, social, and technological environments rather than as passive recipients of policy. Teachers are not displaced by this model; instead, their roles become more complex, encompassing pedagogical design, facilitation, critical evaluation of AI-generated content, and guidance in responsible language use. Institutions provide the structures through which the three dimensions are translated into curriculum, pedagogy, and assessment. At the same time, institutions are embedded within the broader feedback system and are subject to asymmetric pressures: they may respond to policy relatively quickly, while responses to learner and youth practices may develop more gradually.

The framework therefore rests on the principle of asymmetric ecological reciprocity: influence operates in multiple directions, but these directions differ in strength, speed, and institutional directness. As with the framework developed above, the specific asymmetries described here are conceptual claims illustrating the ecology's structure, intended to generate testable propositions for future empirical work rather than to report measured effects. The framework thus rejects both a purely linear model, in which influence flows from policy to learners, and a fully symmetrical network model, in which all components are assumed to affect one another equally. Generative AI further modifies these relationships by functioning as a cross-cutting mediating layer that can accelerate and reshape existing interactions. SEETF consequently conceptualizes Saudi EFL transformation as a dynamic process in which policy, economic transformation, and youth language practice continually interact through educational institutions and practices, while AI increasingly changes the conditions, speed, and visibility of those interactions.

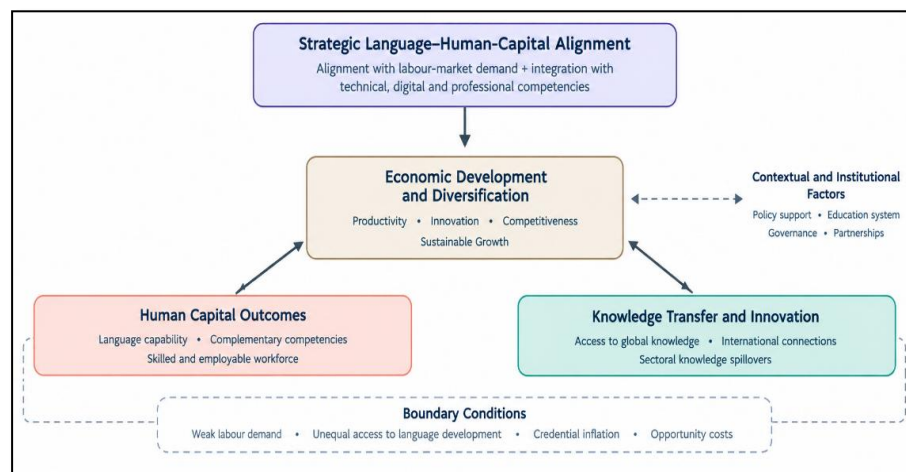


Figure 2. Figure 2. The Saudi EFL Ecological Transformation Framework (SEETF)

8. Conceptual Propositions

The framework generates seven propositions to guide future theoretical and empirical research. Each proposition specifies a relationship among components of the Saudi EFL ecology and identifies a mechanism, direction of influence, or temporal asymmetry that can be empirically examined. Consistent with the asymmetric structure represented in Figure 2, the propositions are stated as predictions of the framework rather than as established findings, and each specifies the evidence that would count against it. They are intended to be tested, refined, or disconfirmed by future research. Table 1, presented after the propositions, identifies candidate indicators, designs, and disconfirming evidence for each.

Proposition 1: Asymmetric Policy Enactment and Feedback. Formal policy changes are expected to produce institutional change in EFL provision faster than institutional and learner practice produces policy revision. That is, the lag from policy to institutional provision is expected to be shorter than the lag from practice-level feedback to policy revision. Institutional change is indicated by dated revisions to syllabi, assessment regulations, or program requirements following a mandate. Feedback is indicated by dated implementation reports, accreditation findings, or stakeholder submissions, and revision by dated policy amendments that cite or respond to them. The proposition would be weakened if practice-based feedback produced policy revision within a timescale equal to or shorter than that of policy-driven institutional change.

Proposition 2: Asymmetric Economic–Educational Reciprocity. Labor-market signals are expected to influence curriculum priorities within a single planning or funding cycle, whereas effects of educational provision on economic outcomes are expected to become detectable only after at least one full graduate cohort has entered the workforce. Demand signals are indicated by English-language requirements in job postings and sector skill-demand reports, curriculum response by dated revisions to course outcomes or program content, and supply-side effects by cohort-level employment and workplace-communication outcomes. Because program length mechanically lengthens the supply-side lag, the substantive claim is that curriculum adaptation to demand occurs substantially earlier than the first measurable cohort effect. The proposition would be weakened if curriculum revision typically lagged behind labor-market signals by more than one cycle, or if cohort-level effects were detectable within the same timescale as curricular response.

Proposition 3: Conditional Divergence and Institutional Adaptation. Sustained divergence between youth English practices and institutional provision is expected to precede institutional adaptation, but not uniformly. Adaptation is expected to occur sooner (a) when the divergence threatens a visible, high-stakes mechanism such as assessment validity or accredited outcomes than when it concerns content, genre, or register, and (b) at the level of formal policy and assessment, and more slowly, in institutions with centralized assessment, but first at the classroom level, informally, and more quickly, in institutions where teachers control assessment. Divergence is indicated by learner surveys, digital-use measures, and curriculum analysis, and adaptation by dated changes to syllabi, assessment, or guidelines. The proposition would be weakened if divergence persisted without adaptation regardless of stakes, or if the

level and speed of adaptation did not differ by assessment structure.

The conditions attached to Proposition 3 rest on an assumption about institutional incentives. Institutions are generally expected to answer for the validity of grades, the integrity of credentials, and the outcomes that accreditation requires. Divergence that threatens these mechanisms, such as AI-assisted production undermining the validity of written assessment, is therefore likely to prompt adaptation sooner than divergence in content, genre, or register, which carries no comparable penalty and can persist unaddressed. The structure of assessment is also expected to matter. Where assessment is centralized, mismatches must be addressed through formal channels, which are slower but more binding. Where teachers control assessment, they can adapt quickly and informally, although such adjustments may never reach formal policy. These are theoretical expectations rather than established findings, and the proposition above specifies the evidence that would count against them.

Proposition 4: Digital Participation and Learner Agency. Changes in digitally mediated English participation are expected to be detectable earlier than corresponding changes in formal institutional records. Specifically, change in digital-use or self-reported participation measures at one time point is expected to predict later change in learner agency (for example, self-directed learning choices and expectations of instruction) and in formal outcomes, more strongly than the reverse. This can be tested using cross-lagged panel designs or repeated measures within cohorts. The proposition would be weakened if institutional assessment records detected the same changes no later than digital-use measures, or if prior formal outcomes predicted later digital participation as strongly as the reverse.

Proposition 5: AI as a Mediating Ecological Mechanism. Generative AI is expected to operate primarily as a mediator, not an independent force: a substantial share of the relationship between policy conditions (for example, AI-related assessment rules), economic demand, and youth practice on one side and EFL learning and assessment outcomes on the other is expected to pass through AI-mediated practices. Mediation is the primary claim. Moderation (AI strengthening or weakening a given relationship) is a secondary claim, tested separately where theory identifies a specific conditional pathway. The proposition would be weakened if AI use predicted outcomes substantially after the hypothesized pathways were specified and measured. Residual effects should be interpreted cautiously, since they may reflect unmeasured pathways rather than independent AI effects, so disconfirmation requires converging evidence across alternative specifications.

Proposition 6: Policy Adaptation Lag Under Rapid AI-Mediated Change. The time from an identifiable change in AI-mediated language practice to a corresponding policy or guideline response is expected to be longer than the time for non-AI practice changes to produce policy responses (the baseline in Proposition 1), and shorter in systems with continuous monitoring, structured stakeholder feedback, and scheduled policy review. This adds two comparisons that Proposition 1 does not: AI versus non-AI practice, and monitoring versus no monitoring as a moderator. Practice change is indicated by repeated surveys of AI use, and response by dated guidance or regulation. The proposition would be weakened if AI-related responses were no slower than baseline responses, or if monitoring did not reduce the lag after accounting for

institutional capacity.

Proposition 7: Bounded Ecological Integration. Reforms that address policy, assessment, curriculum, and AI governance in coordination are expected to produce more sustained alignment among these components than isolated reforms targeting one component. Alignment is indicated by consistency across dated policy, assessment, and curriculum documents, and by its persistence over at least two reform cycles. The proposition would be weakened if isolated reforms achieved equivalent alignment and persistence after controlling for institutional capacity and implementation conditions.

Table 1 summarizes how each proposition can be operationalized. For every proposition, it identifies candidate indicators, a suitable research design, and the result that would count against it, so that the asymmetries proposed by the framework can be assessed empirically rather than assumed. The temporal propositions (1, 2, 3, and 6) are expressed as comparisons of the time that elapses between an observable change in one component and the first documented corresponding change in another. The indicators are illustrative of the kinds of evidence the framework implies and do not constitute a required measurement set.

Table 1

Operationalization of the SEETF Propositions: Indicators, Designs, and Disconfirming Evidence

Proposition	Constructs and indicators	Design	Disconfirming result
P1. Asymmetric Policy Enactment and Feedback	Policy to institution: dated mandate, then dated revisions to syllabi, assessment regulations, or program requirements. Practice to policy: dated implementation reports, accreditation findings, or stakeholder submissions, then dated policy amendments citing them.	Document analysis of dated events across institutions; compare the lag from policy to institution with the lag from feedback to revision.	Feedback-to-revision lag is equal to or shorter than policy-to-institution lag.
P2. Asymmetric Economic–Educational Reciprocity	Demand: English requirements in job postings, sector skill reports. Curriculum response: dated revisions to course outcomes or content.	Multi-year time series of demand indicators and curriculum revisions; tracer data for graduate cohorts.	Curriculum response lags demand by more than one cycle, or cohort effects appear on the same timescale as curricular response.

	Supply effect: cohort-level employment and workplace-communication outcomes.		
P3. Conditional Divergence and Institutional Adaptation	Divergence: learner surveys, digital-use measures, curriculum analysis. Adaptation: dated changes to syllabi, assessment, or guidelines. Moderators: stakes (assessment validity vs. content or genre) and assessment structure (centralized vs. teacher-controlled).	Comparative multi-institution study with follow-up across curriculum cycles.	Divergence persists without adaptation regardless of stakes, or speed and level of adaptation do not differ by assessment structure.
P4. Digital Participation and Learner Agency	Participation: self-reported and logged digital English use. Agency: self-directed learning choices, expectations of instruction. Formal outcomes: assessment records.	Cross-lagged panel or repeated-measures cohort design.	Assessment records detect changes no later than digital measures, or prior formal outcomes predict later digital participation as strongly as the reverse.
P5. AI as a Mediating Ecological Mechanism	AI-mediated practice: repeated surveys or logs of AI use. Antecedents: AI-related assessment rules, demand signals, youth practice. Outcomes: EFL learning and assessment measures.	Mediation models (primary); moderation tested separately for specified pathways; process-tracing case studies.	AI use predicts outcomes substantially after hypothesized pathways are specified and measured, across alternative specifications.
P6. Policy Adaptation Lag Under Rapid AI-Mediated Change	Practice change: dated shifts in AI-use prevalence. Response: dated guidance or regulation. Moderator: monitoring, stakeholder feedback, scheduled review.	Compare time to response for AI vs. non-AI practice changes (the Proposition 1 baseline) and across monitoring arrangements.	AI responses are no slower than baseline, or monitoring does not shorten the lag after accounting for institutional capacity.

P7. Bounded Ecological Integration	Alignment: consistency across dated policy, assessment, and curriculum documents. Persistence: alignment sustained over at least two reform cycles.	Comparative case studies or process tracing; quasi-experimental where credible comparison groups exist.	Isolated reforms achieve equivalent alignment and persistence after controlling for institutional capacity.
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Note. Lags refer to the elapsed time between an observable change in one component and the first documented corresponding change in another. Indicators are illustrative, not a required measurement set. SEETF = Saudi EFL Ecological Transformation Framework.

9. Implications for Saudi EFL Policy and Practice

The framework's implications follow not from the general claim that policy, economic transformation, youth practice, and AI are related, but from the specific asymmetries and timescales identified in Propositions 1 through 7. Each implication below is therefore tied to the mechanism that generates it rather than presented as a general institutional recommendation that could follow from any ecological account. The specific mechanisms proposed, including implementation reports, review cycles, and monitoring processes, are illustrative of the kinds of intervention suggested by the framework's logic. Consistent with the status of Propositions 1 through 7 as predictions rather than established relationships, these mechanisms are not presented as the only, or necessarily optimal, means of addressing the identified asymmetries.

First, policy feedback requires a mechanism, not an intention. Proposition 1 identifies a central issue in policy enactment: institutions and learners influence policy indirectly through implementation evidence, accreditation processes, and public discourse, but such feedback may reach policymakers slowly and often only after aggregation. The implication is not that policy should simply "listen more," but that, to the extent this asymmetry is empirically confirmed, the structural lag in feedback would need to be addressed through a standing mechanism. For example, institutions could be required to submit annual implementation reports documenting significant gaps between policy intentions and local enactment, rather than relying primarily on accreditation cycles or ad hoc research to identify such gaps years later. Such a mechanism would carry administrative costs, and its value would depend on whether the resulting information meaningfully shortens the feedback lag rather than adding a reporting burden. This trade-off is therefore itself a reasonable subject for future evaluation. Without some mechanism of this kind, however, policy intent alone may be insufficient to alter the structural conditions that produce delayed feedback.

Second, economic transformation should inform curriculum design at a timescale responsive to labor-market demand without collapsing English education into employability training. Proposition 2 distinguishes a relatively fast demand-side effect, in which labor-market signals can reshape curriculum priorities within funding or planning cycles, from a slower supply-side effect, in which education contributes to economic transformation as successive cohorts enter

the workforce. Curriculum review could therefore respond to labor-market signals on a more regular basis, for example through annual or biennial reviews informed by sectoral demand, rather than relying exclusively on the longer cycles associated with comprehensive curriculum reform. At the same time, such responsiveness should not collapse English education into employability training. Academic literacy, intercultural communication, critical thinking, and participation in global knowledge networks remain legitimate educational objectives because economic transformation is one influence on curriculum design, not its sole rationale.

Third, sustained divergence between youth language practice and curriculum could function as an institutional early-warning signal rather than merely as a classroom engagement issue. Proposition 3 treats youth language practice as the force in the ecology most likely to change rapidly and to function as a leading indicator of areas in which formal provision may eventually need to adapt. The implication is therefore broader than using students' informal interests as motivational bridges into formal lessons. Institutions could monitor the relationship between learners' documented informal practices, including the platforms, genres, and communicative demands they navigate outside class, and current curriculum provision. Where substantial and sustained divergence is identified, this information could inform formal curriculum review rather than leaving institutional responsiveness dependent primarily on individual teachers' awareness of changing student practices.

Fourth, AI governance could be integrated into existing policy domains rather than developed solely as a parallel AI-use policy. This implication follows directly from positioning generative AI as a cross-cutting mediating force rather than as a fourth independent force. If AI's significance lies in how it changes the speed, visibility, and form of policy, economic, and youth-practice influences, then its governance could be embedded within assessment, curriculum, and teacher-development policies rather than addressed exclusively through a separate policy track. Concretely, assessment policy might specify how AI-assisted work is evaluated within existing grading criteria, while curriculum guidance could address AI-related digital literacy as an extension of existing literacy objectives. A separate AI policy may still be useful for particular governance purposes, but if it operates independently of these domains, it could reproduce the parallel-track structure that the framework seeks to avoid. Learners nevertheless need opportunities to evaluate AI-generated language critically, and this capability can be incorporated into existing literacy and assessment objectives rather than necessarily treated as a wholly separate competency.

Fifth, teacher preparation should prioritize professional judgment alongside technical familiarity with AI tools, while recognizing that the capabilities and limitations of AI systems will continue to change. Section 7 positions teachers as agents who navigate the ecology rather than as conduits for policy or operators of technology. An important implication is therefore that teacher preparation should address forms of professional judgment that remain particularly important under current conditions: evaluating whether AI-assisted work reflects genuine learning, redesigning assessment so that it remains meaningful when AI is available and determining when AI-generated feedback should be questioned or overridden. Studies of Saudi university educators point to related constraints: about half of surveyed educators were at stages of understanding and familiarity with generative AI integration (Alammari, 2024), and EFL

instructors reported that positive attitudes alone did not lead to meaningful integration without clearer institutional support and targeted professional development (Alderaan, 2026). Prompt design and tool familiarity remain useful, but they are insufficient on their own. Teacher education that treats AI competence as primarily technical may prepare teachers to operate particular tools without adequately preparing them to exercise the professional judgment required to evaluate their pedagogical and linguistic consequences. Because AI capabilities will continue to evolve, this preparation should itself be designed as an adaptive professional capacity rather than around a fixed set of tools.

These five implications should not be interpreted as a fixed hierarchy of interventions. Their relative timing follows from the different temporal dynamics identified in the framework rather than from an assumption that one intervention is universally more valuable than another. Policy-feedback mechanisms, youth-practice monitoring, and AI governance concern processes that may change relatively rapidly and may therefore require institutional mechanisms capable of detecting and responding to change on correspondingly shorter timescales. Teacher-education reform, by contrast, necessarily operates over longer professional-development and institutional cycles. Economic and curriculum reform may occupy intermediate timescales, depending on institutional planning and sectoral demand. The implication of the ecological model is therefore not that all reforms should occur simultaneously or with equal expectations of immediate impact, but that institutional responses should be calibrated to the different speeds, capacities, and feedback structures through which change occurs. An ecological framework that emphasizes unequal influence and temporal asymmetry should consequently treat the timing and sequencing of institutional responses as part of the policy problem itself.

10. A Research Agenda

The SEETF generates a research agenda organized around its seven propositions, each of which specifies a testable mechanism, asymmetry, or timescale rather than merely asserting that the three primary forces are related. The directions below are grouped accordingly, moving from questions that can be addressed with current or near-term data to those requiring sustained, multi-year research investment. This sequencing reflects the framework's central premise that different components of the Saudi EFL ecology operate at different speeds and that empirical research should therefore be designed around the temporal characteristics of the relationships it seeks to examine.

Testing policy enactment and feedback (Proposition 1) — near-term. Research could investigate how Saudi EFL teachers and institutions interpret and enact emerging language and AI policies, but the more distinctive question concerns how long it takes for implementation gaps to reach policymakers and contribute to policy revision. Studies could compare institutions with different reporting structures, for example, those with standing implementation-feedback channels and those relying primarily on periodic accreditation review, to examine whether more systematic feedback mechanisms are associated with more responsive policy revision. Such research should measure both the extent of implementation gaps and the time elapsed before corresponding policy adjustments occur. This design would

directly assess the asymmetry identified in Proposition 1 rather than merely documenting how policy is interpreted and enacted. Where institutional capacity differs substantially across settings, research should account for these differences when evaluating whether feedback structures themselves are associated with faster policy response.

Testing economic–curriculum lag with an explicit time horizon (Proposition 2) — multi-year. Rather than asking whether changing economic priorities produce changes in English curricula, longitudinal research should measure the lag between documented labor-market shifts and corresponding curriculum revisions. This requires an observation period long enough to capture both the relatively rapid demand-side influence of economic change and the slower supply-side effects through which educational investment contributes to economic transformation. A study covering only one or two academic cycles risks concluding that no relationship exists when the framework instead predicts a delayed effect. Research should therefore track labor-market indicators, curriculum decisions, and, where feasible, subsequent graduate outcomes across multiple cycles, allowing the timing and direction of influence to be examined rather than inferred from cross-sectional associations.

Testing youth practice as a leading indicator (Proposition 3) — near-term, with multi-year follow-up. Research could examine how Saudi university students use English and generative AI outside formal learning environments, but the more theoretically relevant question is whether documented gaps between informal practice and curriculum content predict subsequent institutional or curriculum change, and with what time lag. Establishing the initial gap is feasible in the near term through learner surveys, interviews, digital-use measures, and curriculum analysis. Confirming its predictive value, however, requires following institutions over subsequent curriculum or policy cycles to determine whether substantial and sustained divergence is followed by institutional adaptation. This design would test Proposition 3's strongest claim, that youth language practice can function as an early-warning signal, rather than merely describing informal English use as a phenomenon of interest.

Testing digital participation and learner agency (Proposition 4) — near-term, with longitudinal extension. Research should examine whether changes in digitally mediated English-language participation are associated with subsequent changes in learners' motivation, identity, communicative practices, and expectations of formal instruction. Rather than treating digital participation as a high-versus-low individual characteristic, longitudinal studies could track changes in informal digital engagement and examine whether those changes precede corresponding changes in formal learning behavior within the same cohort. Mixed-method designs could combine learner self-reports, digital-use measures, interviews, and classroom or curriculum data. Such research would clarify whether digital participation primarily supplements existing EFL provision or contributes to emerging learner practices and expectations to which institutions subsequently respond. The temporal ordering of these changes is particularly important because Proposition 4 concerns the possibility that informal digital participation becomes visible before corresponding changes appear in conventional institutional measures.

Testing AI as a mediator rather than an independent force (Proposition 5) — near-term,

with case-study depth. The framework's treatment of generative AI as a cross-cutting mediating force is one of its most distinctive theoretical claims and requires direct empirical examination rather than assumption. Research could compare competing explanatory models in which AI is treated as an independent predictor versus a mediating or interacting mechanism through which policy, economic, and youth-practice influences are expressed. Where the theoretical structure supports it, quantitative studies could use mediation or moderated-mediation models to examine whether AI-related practices help explain relationships between these forces and selected EFL outcomes. Qualitative case studies could complement such analyses by tracing institutional processes, for example, the introduction of an AI-related assessment policy, to determine how policy changes, economic pressures, and youth practices shape the adoption and consequences of AI. The purpose would not be to demonstrate that AI is always mediated by these forces, but to determine whether its observed effects are better explained through the ecological relationships specified by SEETF than through models that treat technology as an independent domain of transformation.

Testing policy adaptation under asymmetric feedback (Proposition 6) — multi-year. Comparative research could examine institutions or EFL systems that adopt anticipatory mechanisms for monitoring emerging AI practices alongside those that respond primarily after AI use has become institutionally disruptive. Such studies could assess whether anticipatory approaches reduce the policy lag identified in Proposition 1, particularly in the AI domain, where adoption and informal use may change more rapidly than formal policy processes. The key outcome would not simply be whether institutions adopt AI policies, but whether the timing and structure of policy responses become more closely aligned with the practices they seek to govern. Because institutions adopting anticipatory approaches may also differ in leadership, resources, technological capacity, or existing policy infrastructure, comparative studies should account for these differences when evaluating whether anticipatory mechanisms themselves are associated with improved responsiveness. Establishing such effects would require observation across multiple policy cycles rather than a single point-in-time comparison.

Testing integrated versus isolated reform (Proposition 7) — multi-year. Research could compare settings in which language policy, assessment policy, and AI governance are reformed in coordination with one another with settings in which AI policy is introduced as a relatively standalone intervention while curriculum and assessment structures remain largely unchanged. Depending on the availability of suitable cases, such research could use comparative case studies, longitudinal process tracing, or quasi-experimental designs where credible comparison groups exist. The central question would be whether coordinated interventions produce more systemically aligned changes than isolated reforms, after accounting for differences in institutional capacity and implementation conditions. Tracking outcomes across multiple reform cycles would also help distinguish genuine differences in effectiveness from short-term implementation effects. Such research would provide a direct test of the framework's claim that reforms are likely to have more limited effects when they fail to account for interdependence among the ecology's components.

Taken together, these seven research directions can be organized roughly into two groups with different resource and timeline implications. Propositions 1, 4, and 5 can be pursued with data

that at least some institutions already hold or could begin collecting immediately, making them feasible starting points for a research program building on SEETF. Propositions 2, 6, and 7 require sustained observation across multiple policy or curriculum cycles and are correspondingly slower and more resource-intensive, while Proposition 3 occupies an intermediate position: establishing the initial practice–curriculum gap is feasible in the near term, but determining whether that gap predicts subsequent institutional change requires longer follow-up. This sequencing mirrors the asymmetric timescales proposed by the framework itself. Consistent with the first implication’s emphasis on policy-feedback infrastructure as a potentially tractable starting point for institutional reform, the research agenda’s near-term priorities are those most readily enabled by existing or developing data and feedback structures, whereas its multi-year priorities correspond to slower-moving relationships whose effects cannot be adequately assessed within a single academic or policy cycle.

The framework is subject to an evidential limitation. It draws on language-policy, human-capital, ecological, and AI-in-education scholarship, much of it from outside Saudi Arabia, and the Saudi-specific empirical literature currently addresses attitudes, practices, and policy enactment in particular settings rather than the relative timing of change across the ecology. The asymmetries proposed here are therefore theoretical expectations, not findings about Saudi EFL. This limitation motivates the propositions and Table 1: they specify the evidence needed to establish, refine, or disconfirm these asymmetries in the Saudi context.

11. Conclusion

Saudi EFL is situated within a period of substantial social, economic, educational, and technological change. The growing importance of economic diversification, human-capital development, digital participation, and artificial intelligence means that English education can no longer be adequately conceptualized as a self-contained classroom activity. The purposes and contexts of English learning are changing alongside the wider society in which education takes place, and these changes occur at different speeds.

This conceptual article has argued that an ecological perspective, properly specified, provides a useful way of understanding this transformation. The proposed Saudi EFL Ecological Transformation Framework (SEETF) brings together three forces that are often examined separately, language policy, economic transformation, and youth language practice, within an educational environment comprising institutions, teachers, learners, curriculum, pedagogy, and assessment, with generative AI increasingly functioning as a mediating layer. AI is not treated as a fourth force acting alongside the other three. Rather, it changes how those forces are expressed and experienced within the educational ecology: policy must increasingly address AI use, economic transformation is generating demand for AI-literate graduates, and youth practice is incorporating AI tools at a pace that may exceed institutional adaptation, although the extent of this pattern among Saudi learners remains an empirical question. The framework consequently moves beyond a linear policy-to-classroom model without assuming a flat network of equal mutual influence. Instead, it conceptualizes Saudi EFL as a system of asymmetric reciprocity in which components shape one another with different degrees of strength, direction, speed, and institutional capacity.

The significance of the framework therefore lies not in claiming that policy, economic transformation, youth practice, or AI determines the future of Saudi EFL, but in specifying how these processes interact under conditions of asymmetry. National policy carries formal authority to influence institutions in ways that institutions cannot symmetrically exercise over policy. The framework further predicts that economic demand can reshape curriculum priorities more quickly than curriculum reform can produce broader economic effects, and that youth language practices can change more rapidly than formal educational provision can respond. These temporal relationships are propositions of the model rather than established measurements for the Saudi context. Generative AI further alters these relationships by accelerating, reshaping, and making more visible processes already occurring within the ecology. The resulting challenge is therefore one of coordination across different timescales rather than simple expansion of English provision.

For Saudi EFL, the central challenge is not simply how to teach more English or how to coordinate a set of separate domains of change. It is how to develop an educational ecology whose institutions can operate across multiple timescales: responsive enough to recognize emerging youth practices and AI-mediated forms of learning while stable enough to sustain the longer processes of policy development, curriculum reform, and teacher preparation. This requires feedback mechanisms capable of connecting policy with local enactment; curricula that remain responsive to changing economic and communicative demands without reducing English to employability; institutional recognition of learners' digitally mediated linguistic lives; and AI governance embedded within existing policy, curriculum, assessment, and professional structures rather than developed as a parallel track. These responses should not be understood as uniformly applicable or equally urgent, since the framework itself predicts differences in influence, institutional capacity, and speed across the ecology.

The SEETF provides a conceptual basis for this reconceptualization, while its seven propositions generate a focused agenda for empirical inquiry. Future research can test the framework's claims concerning policy-feedback lags, economic–curriculum relationships, youth practice as a potential leading indicator, digital participation and learner agency, the mediating role of AI, policy adaptation under asymmetric feedback, and integrated reform. Such research can establish whether the proposed asymmetries are empirically observable, how they vary across institutional contexts, and whether their effects change over time. The framework should therefore be understood not as a completed explanation of Saudi EFL transformation, but as a theoretically grounded model that generates propositions capable of being supported, refined, or disconfirmed through empirical research. Its broader contribution is to provide a way of investigating Saudi EFL not as a collection of separate educational, social, economic, and technological developments, but as an evolving ecology in which these processes interact, influence one another unevenly, and operate on different timescales.

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