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Reconceptualizing Individual Differences through the Lens of Sociocultural Theory in AI-Mediated Language Learning

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Abstract

For a long time, motivation and anxiety, as traits of individual differences (IDs), have been understood as significant factors in learning a second language (L2) successfully. Scholars conceptualized these two traits as learners' internal traits. In this article, we, as the authors, use sociocultural theory (SCT) to revisit these traits and reconceptualize them. Therefore, we argue that these traits are not merely unchanged qualities; instead, they are the outcome of a learner's engagement in a socially meaningful practice during the L2 learning process. Meanwhile, current research findings show that other factors, such as linguistic aptitude, L1 literacy, and L2 metalinguistic skills, play a part in L2 learning. These factors are not only applicable to a traditional classroom environment, but we believe that with the emergence of AI-mediated learning tools, such as chatbots, adaptive learning platforms, and AI tutors, they can be used as scaffolding techniques for learners' participation. We further argue that if AI tools are used systematically to meet learners' needs, they can enhance learning processes, and this can reduce L2 anxiety and increase motivation. A sociocultural perspective, therefore, provides a productive way to understand how motivation and anxiety unfold in AI-mediated language learning, while remaining attentive to the linguistic resources that adult learners bring with them.

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[1]Introduction

During the learning of a second language (L2), individual differences (IDs) have consistently received significant attention in the learning process. However, language anxiety, as one aspect of IDs, is often reported as an effective factor in learning outcomes. In this regard, according to Horwitz et al. (1986, p. 128), language anxiety is a "distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language-learning process." That is, according to Horwitz et al. (1986), language anxiety is an emotional reaction that hinders language performance. This understanding made the authors develop the Foreign Language Classroom Anxiety Scale (FLCAS) (Horwitz et al., 1986). However, over the last 30 years, a long line of empirical evidence, including longitudinal studies, challenged this understanding. The most comprehensive critiques, repeatedly demonstrated in multiple large-scale studies by Sparks and colleagues, show that so-called "L2 anxiety" is not an independent causal force but rather a proxy for underlying language skills, including first language (L1) literacy, L2 aptitude, and developing L2 achievement.

The evidence for this reinterpretation is now extensive. Longitudinal work consistently shows that scores on the FLCAS and related instruments correlate strongly with L1 reading, phonological processing, and broader metalinguistic abilities measured many years before learners begin L2 coursework (Sparks & Ganschow, 1991; Sparks & Patton, 2013). A recent study confirms that the pathways run from L1 skills to L2 aptitude to L2 achievement, and only then to students' reported "anxiety," reversing the causal direction typically assumed in earlier affective frameworks (Alamer et al., 2025). Additional models focusing specifically on L2 reading demonstrate that L1 metalinguistic knowledge and L2 reading ability directly predict L2 reading anxiety, both concurrently and longitudinally (Sparks & Alamer, 2023). In parallel, latent growth curve modelling work confirms that anxiety does not influence the growth of L2 achievement; rather, initial low achievement predicts elevated anxiety, while subsequent growth is driven solely by language-related skills (Sparks & Alamer, 2024). This long line of empirical findings has been further supported by a recent study (Alamer et al., 2025). The authors found that when learners' vocabulary knowledge is deliberately increased, their anxiety decreases as a downstream consequence of improved linguistic competence—not because any anxiety-reduction strategy is applied (Alamer et al., 2025).

Collectively, these studies form what Sparks called a chain of evidence. According to this position, L2 anxiety instruments measure learners' self-perceptions of their linguistic ability rather than a distinct psychological construct(Sparks, 2025). Rather

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than understanding language anxiety as an emotional barrier, apparently, anxiety reflects learners' accurate awareness of their language-learning challenges.
When researchers link learners' difficulties to anxiety rather than linguistic skills, they may miss the source of the main problem. In this regard, Sparks (2012) argues that when there are struggling learners in L2 classes, their teachers should first think of language-related issues, not anxiety. Sparks's understanding of L2 anxiety questions decades of research findings that when L2 anxiety is reduced, learners' achievement will increase.

In addition to various understandings of L2 anxiety, the rapid introduction of artificial intelligence (AI) may affect our understanding of L2 anxiety from now on. For example, recent systematic reviews indicate that through an AI-assisted environment, several L2 learners' emotions can be elicited, including L2 anxiety. However, the authors also found a relationship between learners' emotional responses and their current linguistic profile. They concluded that anxiety alone cannot be considered an independent causal mechanism (Zhang & Liu, 2025). Collectively, these findings strengthen the conclusion that affective reactions in L2 contexts must be interpreted in light of several factors, including learners' actual language abilities, task demands, and histories of success or struggle.

Based on the available empirical evidence, it can be inferred that it is wrong to treat language anxiety as a pure psychological trait. Therefore, based on the evidence, language anxiety is related to learners' linguistic difficulties, which are shaped by several other factors, such as their L1 foundations, L2 aptitudes, and the linguistic task complexity during L2 learning. Therefore, to reduce anxiety, L2 teachers should work harder on how to improve L2 language skills and strengthen learners' linguistic resources. These steps have been found to reduce anxiety over time (Alamer et al., 2025; Sparks & Alamer, 2023).

Recently, we have seen a rapid rise in the use of AI tools in language education, which provides a new context for revisiting these reconceptualizations of IDs. For instance, intelligent tutoring systems, adaptive learning platforms, and chatbots create new forms of mediation and interaction. For example, among ESL/EFL learners, a supportive chatbot may scaffold practice and reduce the fear of negative evaluation, thereby lowering anxiety and enhancing willingness to communicate. However, when there is no alignment between a learner's ZPD and the used AI system, there is a possibility of increasing frustration and reducing motivation. Nevertheless, AI tools are not always perfect, and they may be liable. Therefore, when there is no carefully pedagogically designed framework with the AI tools, learners' needs may be overlooked, and this might lead to distrust in these tools and increase anxiety. In this regard, findings from previous studies indicate that L2 learners might be very sensitive to these dynamics, especially those whose lives are already full of responsibilities, but they may have professional reasons to learn the target language (Koedinger et al., 2012; VanLehn, 2011).

As the reviewed literature emphasizes the importance of motivation and anxiety as crucial ID traits for L2 learning, we have taken a different path to explore how these traits can be better understood through SCT, particularly how AI-mediated tools affect learners' emotional and motivational experiences. In this study, we believe that motivation and anxiety should not purely be viewed as fixed traits, but rather be seen as rational and socially mediated traits. Therefore, we argue that L2 teachers should aim to design AI-enhanced environments that scaffold learners' ZPDs, where their identities are respected, and help to create a more effective learning process. Following this suggestion, the value of technology can be noticed in its efficiency and capacity that serves as a cultural tool to build more confidence and effective L2 engagement (Darvin & Norton, 2015; Engeström, 2001; Lave & Wenger, 1991).

Sociocultural Theory and Second Language Learning

According to Lev Vygotsky's Sociocultural theory (SCT), human cognitive development is fundamentally a socially mediated process. In contrast to individualistic theories, learning solely occurs inside the mind. According to SCT, mental functions are the product of social interaction, which the individual then internalizes. In this regard, Vygotsky (1978) states that "learning is a necessary and universal aspect of the process of developing culturally organized, specifically human psychological functions" (p. 90). In other words, an individual's development occurs when they participate in culturally structured activities. These activities can be with their families or peer interactions, or any formal instructional setting, such as schools. In terms of the process of learning an L2, according to this theory, learning a language is not a matter of only the learners' individual aptitude or motivation, but rather it is deeply linked to learners' interaction with others, such as teachers, peers, or more proficient speakers through using culturally mutual resources, such as a language or symbolic tools, in our case, AI tools (Donato, 1994; Lantolf & Thorne, 2006; Vygotsky, 1978). So far, we have described SCT as a powerful interpretive lens; however, within this theory, constructs such as mediation, perezhivanie, and the ZPD are challenging for researchers to operationalize using large-scale quantitative methodologies. As a result, research grounded in SCT theory relies solely on qualitative or microgenetic approaches to explore emotional experience in depth, which may be difficult to generalize to other contexts. This leads to methodological conflict with traditional ID research, where researchers mainly rely on standardized instruments and statistical analysis.

In this study, we are interested in two fundamental concepts in SCT: mediation and the Zone of Proximal Development (ZPD). To begin with, mediation refers to the idea that humans' mental activities do not act directly. Human beings, as regulating procedures, use cultural artifacts, tools, and signs to enhance these activities. An example of a mediational tool is language (whether spoken, written, or internal self-talk). Through language, we can frame problems, recall information, and guide our thinking. Physical tools (like a calculator, or in our context, a computer or smartphone) also mediate cognition by extending our capabilities. Lantolf and Thorne (2006, p.

197) emphasize that humans are "understood to utilize existing, and to create new, cultural artifacts that allow them to regulate and control their behavior." In an SLA context, this means learning is facilitated by mediational means such as dictionaries, educational software, or interactional protocols – all of which can be seen as tools that scaffold the learner's performance and understanding (Lantolf & Poehner, 2014; Wertsch, 2007).

The Zone of Proximal Development (ZPD) is perhaps the best-known Vygotskian concept. It is defined as the gap between what a learner can currently do alone and what they can do with the guidance or collaboration of a more knowledgeable other. In Vygotsky's words (1978), ZPD is "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers." (p. 86). For example, when learners receive assistance from a teacher, a tutor, a peer, or even a tool, such as AI tools, this enables the learner to perform better at a higher level than they could without any help. Over time, the continuous help from a more knowledgeable being or entity might enable the learner to internalize new skills. Through this process, ZPD shifts our focus from viewing a learner's ability from a static to a dynamic view of how learning may happen through interaction. Furthermore, this process can have pedagogical implications, for example, when L2 instructions target ZPD, they challenge the learner to go beyond their ability alone, and support learning, that is, scaffolding to bridge the gap between the learner and the more knowledgeable being (Donato, 1994; Poehner & Lantolf, 2005; Vygotsky, 1978, 1994).

Lantolf and Thorne (2006) argue that when L2 learning is based on SCT, learning a new language is not fundamentally different from other forms of cognitive development. This process requires mediation and occurs through socially scaffolding techniques using language. Let us take a practical example: when there is a conversation between a learner and a more proficient speaker, this interactive dialogue can serve as a scaffold. Many things may happen along the way, for example, the proficient speaker might adjust their language, ask questions, request clarification, and even provide feedback. All of those help the learner participate in interactions that go beyond their current proficiency level. Such interactions form a ZPD that enhances the learner's language development, such as learning new words or grammatical forms in a meaningful context. These processes are supported by those studies that favor interaction and corrective feedback, and dynamic assessment (Gass & Mackey, 2020; Lantolf & Poehner, 2004; Long, 2018; Poehner & Lantolf, 2005).

Furthermore, cognition and emotion are two key components of SCT. In this regard, Vygotsky (1978) dealt with thinking and feeling as one combined domain. He believed that they are intertwined in every human action. Some other scholars have also held this view (Swain, 2013). This viewpoint has an important implication in the L2 teaching process because learners' feelings, such as confidence and anxiety, affect the

degree of cognitive engagement with the language tasks during this process. In addition to that, we can view emotions as culturally mediated. For example, during a speaking activity in the class, a learner may feel anxious. However, this level of anxiety might be mediated by internal self-talk. This emotional and cognitive experience can be further understood and examined through perezhivanie; in this sense, this concept is concerned with emotional and cognitive experience. That is, how a learner, or any individual, can experience a situation where feelings can be interpreted (Swain, 2013; Vygotsky, 1994). As we will see, this holistic perspective provides a useful framework for understanding phenomena like motivation and anxiety as they play out in real time during learning activities, including those involving AI tools (Qin et al., 2022).

Therefore, revisiting individual differences, such as motivation and anxiety, through the lens of SCT offers a few ways to understand the L2 learning process. Firstly, it holds the view that learning an L2 is a social process. Meaning, cultural tools, in our case, AI tools, can affect learning, and this is directly linked with the learner's ZPD. Secondly, this theory pushes us to deal with cognitive growth, language learning, ID traits, and emotional experience as one package. This view directly goes against a single explanation of success or failure. This theory sees factors, such as motivation and anxiety, not as fixed traits but as dynamics that are socially situated in the learning process (Lantolf & Poehner, 2014; Lantolf & Thorne, 2006; Swain, 2013).

Motivation and Anxiety in SLA: From Individual Traits to Socially Mediated Constructs

Learner motivation has been central to SLA research for decades, widely recognized as a determinant of effort, persistence, and achievement. Gardner's socio-educational model described motivation as a stable disposition involving attitudes, desire, and intensity, distinguishing between integrative and instrumental orientations. In addition to that, other scholars have proposed other frameworks, such as Dörnyei's process model and the L2 Motivational Self System, which added more dynamic and self-related aspects to these frameworks. These models tend to explore how motivation can evolve through images of the ideal or ought-to self. Despite adding these models to the older ones, scholars have still placed motivation within the learner (Dörnyei, 2005, 2009; Dörnyei & Ushioda, 2011; Gardner, 1985, 2010).

However, contrary to the above view, SCT looks at motivation from a broader perspective. That is, according to SCT, motivation, interaction, activity, and contexts all come together (Lantolf & Thorne, 2006). Therefore, when L2 learners engage in meaningful practices, motivation is expected to increase. In this regard, Walker et al. (2006) demonstrated that learners' motivation is linked to classroom dynamics; for example, one task might energize the learners, whereas the same task might be boring. Overall, it depends on peer relations among the learners. Therefore, we can say that motivation is contingent and is mediated by context. This understanding can be noticed, especially among adult ESL learners, as they have immigration goals, high expectations from their families, or even being able to use gamified apps (Hiver et al.,

2020). This understanding is reflected in SCT; for example, Sivan (1986) emphasized that learners' goals are rooted in sociohistorical settings. Ushioda (2009) believes that motivation emerges from interaction in a context. Others (Reeve & Lee, 2014; Ushioda, 2009) stated that motivation is produced in activity, for example, when L2 learners participate in a collaborative project or task, this may lead to engagement. Furthermore, Norton (1995) added her concept of "investment" to this argument and stated that there is a connection between learners' commitment, identity, and power. According to this view, investment is meant to capture how L2 learners put their effort into gaining symbolic and material resources. For example, adult immigrants make an effort and invest in learning English to access more employment opportunities. Therefore, any lack of motivation may result in a lack of opportunities; therefore, according to some scholars, the pedagogical task is to ask not whether learners are motivated, but what forms of investment are afforded in specific contexts (Darvin & Norton, 2015).

Turning to language anxiety, it has undergone a parallel reconceptualization. Horwitz et al. (1986) identified foreign language anxiety (FLA) as a complex of communication apprehension, test anxiety, and fear of negative evaluation, typically treated as a relatively stable attribute. Later work acknowledged situational fluctuations, but the discourse continued to locate anxiety "inside" the learner. SCT reframes anxiety as relational, emergent from the interaction between person and environment. The concept of perezhivanie underscores the unity of cognition and emotion, capturing how learners experience events through personal history and social meaning (Cong-Lem, 2025). Therefore, we can say that anxiety may not only stem from immediate evaluation, for example, during a speaking test, but other factors, such as memories of past failures and self-critical inner speech, can also affect this feeling. For example, when L2 learners practice with a supportive peer or an AI tool, this may boost their confidence rather than fear (Botes et al., 2020; Teimouri et al., 2019; Vygotsky, 1994). For example, Qin et al. (2022) found that several factors affected Chinese EFL learners' anxiety and enjoyment in flipped classrooms, primarily teacher talk, peer support, the technology integrated and used in the class, and even the learners' past histories. Furthermore, it has been found that L2 tasks alone were not a certain factor for giving learners positive or negative emotions; what mattered was how they were mediated. For example, when teachers gave the perception of making errors as a rather effective strategy to improve by using humor-mediated language, it can reduce anxiety. This encourages and fosters learners' willingness to communicate. Therefore, when learners see the environment as supportive, it increases confidence and motivation (Alamer & Alrabai, 2021; Bailey & Lee, 2021; Lou & Noels, 2017).

We have seen that previous studies (Horwitz et al., 1986), mostly treated anxiety as a fixed and stable trait. However, for Richard Sparks and colleagues, their understanding of anxiety is different. They consistently argued that language anxiety should not be treated as an independent affective construct that causally undermines second language learning. From a very long line of empirical evidence and longitudinal

studies, they have found that factors, such as individual differences in first-language (L1) skills, language aptitude, and L2 achievement, are strong predictors of L2 anxiety (Alamer et al., 2025; Sparks & Alamer, 2023, 2024; Sparks & Patton, 2013). For example, in an over 10-year longitudinal study, Sparks and colleagues found that learners who report higher anxiety typically display weaker L1 literacy and lower aptitude even years before beginning L2 study, and that the path from L1 ability to later anxiety is mediated by aptitude and L2 performance rather than the reverse (Sparks & Alamer, 2022). These findings have been supported by similar results from more recent studies (Sparks & Alamer, 2024). Based on these findings, revisiting language anxiety from an SCT perspective may offer a more practical understanding of the learning and teaching process. For example, through mediation, using an AI tool to help learners practice their speaking skills (Klímová & Ibna Seraj, 2023). This may extend their abilities beyond their current ZDP (Koedinger et al., 2012; VanLehn, 2011). In this case, chatbots can provide corrective feedback (CF) in various forms, such as direct and recast feedback, and conversational practice. However, an important characteristic of AI tools may be perceived as a space where learners are not judged for their errors. For instance, many adult learners described AI tools as patient and non-threatening, therefore reducing performance anxiety (Huang et al., 2025).

However, using these tools may not always lead to positive outcomes. That is why, according to activity theory, the effectiveness of tools is dependent on other factors, such as the community; here, the classroom, teachers, and peers can be understood as such, and the rules, that is, how these tools are used appropriately (Engeström, 2001). For example, when a chatbot is integrated into the classroom as a partner to enhance engagement and participation, without supervision and guidance, this may lead to more confusion and disconnection. Studies have reported positive effects of these tools that affected learners' motivation, yet without close observation and guidance, these tools may lead to demotivation (Pack & Maloney, 2023; Wang & Xue, 2024; Zhou, 2024). Collectively, results from previous studies suggest that AI tools can mediate learning, whether through using chatbots that provide feedback or even through peer interaction. These studies reported that such tools can enhance learners' motivation and provide a more supportive context that finally reduces anxiety (Ballıdağ & Aydın, 2025; Mohammed & Khalid, 2025; Shao, 2025).

As presented above, we have shown that SCT places motivation in activity. However, this theory has been criticized for ignoring some other, more stable traits, such as linguistic aptitude, L1 literacy, and early metalinguistic skills. Scholars (e.g., Alamer et al., 2025; Sparks, 2012; Sparks, 2025; Sparks & Alamer, 2022, 2023, 2024) found supportive evidence for this view in a line of longitudinal studies. Therefore, we should remember that SCT might not completely replace cognitive-linguistic explanations. Therefore, this theory should be used as a complement, accounting for how emotional experience can be better examined in interaction. Therefore, AI tools, at present, have even been found effective, but have limitations. For example, the current available AI tools do not have the same characteristics as a human tutor. When an AI bot repeatedly

asks a learner to “try again” as feedback, without empathy, it can be frustrating. Therefore, learners may perceive AI tools' feedback as mechanical without any emotional support. In this regard, scholars have found that when AI is combined with teacher scaffolding, it can be more effective and even affect learner motivation positively (VanLehn, 2011).

In summary, based on the studies reviewed in this article, we can deduce that motivation and anxiety should be understood not as fixed inner traits but as mediated and dynamic traits. On the one hand, motivation is linked to activities that affect learners' engagement and identities. On the other hand, anxiety is considered a rational experience, and it is affected by past histories and achievements. Furthermore, in terms of the role of AI tools, they are now perceived as mediational means, that is, they can scaffold learners' cognitive and emotional development. Therefore, as these two traits are connected to cognitive and social factors, SCT offers a robust framework for understanding and designing technology-mediated environments that nurture confidence, reduce anxiety, and sustain engagement (Darvin & Norton, 2015; Lantolf & Thorne, 2006; Swain, 2013; Ushioda, 2009; Vygotsky, 1978).

Implications for Adult ESL/EFL Learners

This study is meant to offer some practical implications for adult ESL/EFL learners, regardless of the context of teaching and learning. For example, adult learners often face greater challenges and issues related to personalized, respectful identities. Therefore, they need more flexible approaches to learning. For those reasons, we attempted to look at motivation and anxiety through SCT. In this regard, according to SCT, when learning is connected to learners' existing cultural and life experiences, acquiring new knowledge can be most effective (Knowles, 1984; Lave & Wenger, 1991). This section presents some implications of this study.

One implication is the importance of contextualization in curriculum and AI content for adults. Adult learners bring diverse sociocultural backgrounds into the classroom. Rather than using one-size-fits-all materials, it is beneficial to draw on topics, scenarios, and tools that resonate with the learners' real-world contexts. For example, an intelligent tutoring system teaching business English could allow learners to input their own professional field and tailor dialogues or writing tasks to that field (mediation through personally meaningful content). This not only makes learning more engaging but also validates the learners' identities, reducing anxiety by positioning them as competent adults, extending their skillset

First, it is crucial to contextualize AI tools in the curriculum, especially for adult learners. For example, adult learners usually come from diverse backgrounds; this automatically brings diverse sociocultural viewpoints into the classroom. Therefore, it may be wise for teachers not to use one-size-fits-all materials. Here, teachers' roles and AI tools can play a great part, such as using various topics, scenarios, tasks, and

even feedback types, and above all, if used, tools that AI tools that resonate with learners' real-life contexts. Doing that not only makes learning more engaging but also connects directly with learners' identities. All those procedures may reduce anxiety and increase the learners' motivation (Darvin & Norton, 2015; Norton, 1995; Ryan & Deci, 2000).

Secondly, we believe that following our suggestions in this study, teachers and educators can make learning more self-directed and, importantly, provide continuous social support. In that sense, AI tools can provide a more autonomous learning environment. This directly reflects adult learners' personalities as they tend to be more self-directed. Once again, learners cannot be left out in isolation because it can be demotivating, which may result in more anxiety. This implication aligns well with SCT's concepts, especially mediation and support from a more knowledgeable being (Lave & Wenger, 1991; Reeve & Lee, 2014; Ushioda, 2009).

SCT also underscores the role of the instructor or facilitator even in high-tech learning environments. For adult learners, the teacher's role can shift to curating resources, advising on strategies, and providing nuanced feedback that AI cannot. Analytics from AI systems can inform responsive scaffolding, while teachers address emotional needs—a partnership consistent with dynamic assessment principles.

Furthermore, through the lens of SCT, the role of instructors or facilitators, even in a high-technology-enhanced learning environment, is emphasized. For example, what technology and AI tools cannot do, teachers can do, such as finding suitable materials, suggesting useful ways to practice, providing personalized feedback with extra metalinguistic explanations, and even being empathetic with learners (Lantolf & Poehner, 2014; Poehner & Lantolf, 2005; VanLehn, 2011).

Finally, when AI-mediated tools are used based on a sociocultural understanding, assessment may be more beneficial than traditional tests. For example, imagine an adult learner who has not taken any tests for years; now, they have to take tests, which may trigger anxiety, especially when they are judged based on their performance. Therefore, AI tools can be used as an alternative, as they can provide formative assessment, such as offering step-by-step prompts. This may lessen feelings of anxiety. This way of assessment aligns with Dynamic Assessment (DA) (Lantolf & Poehner, 2014; Poehner & Lantolf, 2005). For these reasons, when adult learners see and trust that AI tools are there to help them learn rather than judging them, they are more likely to take risks and push themselves to learn more (Ryan & Deci, 2000, 2020).

Overall, we believe that when technology is used based on the idea of SCT's mediation, it offers a version of technology that creates a more effective learning process and promotes connection. However, we should remember that learning is a social process; therefore, when learners feel they are a part of a supportive community, their level of motivation increases and their anxiety lessens (Darvin & Norton, 2015; Norton, 1995;

Ushioda, 2009). However, it is important to acknowledge that AI tools cannot be fully reliable, as they cannot provide a comprehensive account of learners' linguistic foundations. Therefore, teachers need to ensure that when they decide to integrate technology, such as AI tools, into their classrooms, they choose a well-designed, relevant, and mediated approach that aligns with learners' needs, with explicit language instruction that helps them improve their linguistic competence.

Future Directions and Research Questions

In this study, we attempted to reconceptualize motivation and anxiety as socially mediated and context dependent. Although we have discussed several aspects of SCT, motivation, and anxiety, there are still many directions for future research. For example, as AI tools become more common in adult ESL and EFL learning environments, there is a clear need for studies that examine how mediation, perezhivanie, and learner agency can be used to investigate learners' real-time psychological states (Lantolf & Thorne, 2006; Swain, 2013; Vygotsky, 1978).

Furthermore, much of the current results and literature have relied on two methodological approaches: self-reports or cross-sectional surveys. Furthermore, studies on motivation and anxiety mostly relied on self-reports and cross-sectional surveys; therefore, if one wants to contribute to the field, they should investigate how learners' motivation and anxiety change when they interact with chatbots, adaptive learning platforms, ASR, and immediate feedback from those tools (Koedinger et al., 2012; VanLehn, 2011).

Additionally, one part of L2 learners concerns learners' identities and the extent to which they invest in target language learning. In this regard, previous studies have shown that L2 learners do their best to learn the target language, especially when they see identities as an important part of the learning process (Darvin & Norton, 2015; Norton, 1995). Therefore, integrating technology into language learning requires further research to understand how adult learners perceive and interpret this integration, and how technology may affect their identities. For example, there may be two viewpoints on AI-generated feedback: for some learners, it may boost their confidence, whereas for others, it may blur their identities and increase self-doubt, especially when they make errors. Therefore, longitudinal qualitative research can explain why adult learners respond differently. Furthermore, how identity influences both motivation and anxiety across time (Alamer & Alrabai, 2021; Lou & Noels, 2017). In addition to the above points, researchers may ask questions about how L2 learners support or criticize the available AI tools. It is imperative to ask which AI tools support and reduce L2 anxiety and which ones cause more harm than benefit (Botes et al., 2020; Teimouri et al., 2019). At the same time, future studies should remain attentive to how linguistic background, such as L1 literacy and metalinguistic knowledge, continues to shape how adult learners respond to AI mediation, because these foundations may intensify or soften emotional reactions in ways that SCT alone cannot fully account for. Collectively, these directions can strengthen the empirical

foundations of a sociocultural understanding of affect in AI-mediated language learning and support more contextually sensitive pedagogical designs, especially those intended to reduce L2 anxiety by enhancing the learning of target language skills.

Conclusion

In this article, we reframed motivation and anxiety as socially mediated, dynamically emergent aspects of adult ESL/EFL learning, rather than as fixed psychological traits. Our reconceptualization of these psychological aspects is based on Vygotsky's sociocultural theory in relation to SLA. We argue that learners' motivational trajectories and anxiety responses are co-constructed through participation in culturally organized activities and mediated by tools, interlocutors, and norms. In this view, AI technologies such as chatbots, tutoring systems, and adaptive platforms function as mediational tools rather than neutral channels. They can reorganize how learners engage, supporting motivation and confidence in communication, or, if misused, it can increase frustration and anxiety.

We also attempted to position AI tools relative to learners' ZPDs. Based on this understanding, ZPD offers a useful way to think about how AI can support language learning. Therefore, if one thinks of integrating any AI tools, they should select the ones that are well-designed, adjusted according to the target task, provide timely help, and finally show learners their progress in terms of improvement and performance. Furthermore, conversational agents that model patience, rephrase learner output, and treat mistakes as part of the learning process can also reduce the social pressure that often makes speaking so stressful. By contrast, vague feedback, such as giving prompts that miss cultural nuances, risks pushing learners beyond their ZPD, creating doubts and disengagement.

In this study, we selected SCT to revisit motivation and anxiety during technology integration in the L2 learning process for two main reasons. SCT emphasizes two aspects. Firstly, learning tasks and interactions should feel meaningful and connected to learners' real goals and practices. Secondly, the learning agency should be supported. For example, AI can provide flexible practice and precise feedback. At the same time, teachers remain essential in guiding purposes, interpreting analytics with empathy, and offering the kind of emotional support that machines cannot yet deliver. The most promising environments are those that combine the two, where AI enables personalized practice and human teachers foster belonging, perspective, and depth.

At the same time, a balanced view requires acknowledging that sociocultural theory alone cannot fully capture the stable linguistic predispositions that shape learners' affective experience. Research in individual differences demonstrates that L1 literacy, metalinguistic skills, and aptitude continue to exert long-term influence on both achievement and anxiety (Sparks & Alamer, 2024; Sparks & Patton, 2013). These factors give rise to initial differences in confidence and performance that mediation alone cannot erase. A comprehensive account of motivation and anxiety, therefore,

benefits from integrating the strengths of both SCT and cognitive-linguistic ID research, recognizing how enduring linguistic resources interact with situational affordances to shape moment-to-moment emotional experience.

Although this discussion is theoretical, it points to clear directions for design and research. Designers should build systems that are sensitive to the ZPD, clear in their feedback, adaptable across cultures, and capable of gradually fostering independence. Teachers should integrate AI activities into classroom dialogue in ways that allow learners to make sense of their experiences and internalize new strategies. This calls for dynamic, longitudinal approaches that capture the effects of AI tools on motivation and anxiety over time.

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Rizgar Qasim Mahmood: Conceptualization, Investigation, Resources, Writing - Original Draft, Writing - Review & Editing, Supervision, Project Administration

Rebin Abdulqader Azeez: Conceptualization, Investigation, Resources, Writing - Original Draft, Writing - Review & Editing

Generative AI Use Disclosure Statement

Throughout this article, Grammarly was used to correct language issues such as punctuation, offer better word choices, and improve sentence structure, resulting in a smoother, reader-friendly style.

Ethics Declarations

World Medical Association (WMA) Declaration of Helsinki–Ethical Principles for Medical Research Involving Human Participants

Not applicable.

Competing Interests

The authorrs have no competing interests.

Data Availability

There is no data avialable for this study.

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