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Neuro-Cognitive Aspects of Using Online Platforms in Foreign Language Learning

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Abstract: *The rapid expansion of digital technologies in education has reshaped the landscape of foreign language instruction, making the use of online platforms increasingly important in contemporary educational practice. As online learning environments have become increasingly integrated into higher education, there is a growing need to enhance understanding of the ways innovative, technology-mediated approaches are used to support foreign language development, foster learner autonomy, and improve engagement in English as a Foreign Language (hereinafter – EFL) contexts. Despite the growing body of research on the subject-matter in question, limited empirical evidence is provided concerning the effectiveness of different technology-enhanced instructional models in comparative studies. The study aimed to compare the effectiveness of flipped-blended learning, task-based language teaching integrated with sociocultural principles and traditional teacher-centered instruction. The latter were tested in terms of their effectiveness in developing EFL learners' communicative competence, learner autonomy, self-regulation, metacognitive awareness, and language learning strategies. An experimental action research based on mixed methods was employed at two Ukrainian universities. It involved 69 undergraduate EFL learners divided into three groups. The data were collected through communicative competence assessments, a learner autonomy questionnaire, classroom observations, and semi-structured interviews. The intervention group 1 received flipped classroom instruction in a blended mode. The students were offered the option to complete interactive online exercises, take adaptive quizzes, join synchronous speaking labs, and create reflective e-portfolios. Intervention group 2 was working in compliance with a multimodal task-based model supported by sociocultural principles, completing a range of collaborative digital tasks. The control group was taught through conventional, teacher-led instruction with limited technological integration. As a result, the students of all three groups demonstrated positive achievements, yet the intervention group 2 revealed the most noticeable ones. The changes mainly affected their foreign communicative competence and metacognitive awareness development. In addition, the learners advanced in using diverse learning strategies and were more engaged in the learning process. On the contrary, the considerable growth in self-reflection and management of digital tools was seen in the intervention group 1. Finally, the control group made slow progress. These outcomes indicate that technology-enhanced task-based language teaching supported by sociocultural principles brings the strongest results for developing communicative competence, learner autonomy, and learner engagement. On the contrary, flipped-blended learning is particularly effective in promoting reflective learning and the self-regulated use of digital tools. Regarding the quality and depth of foreign language instruction, the research demonstrates the feasibility of innovative approaches to foreign language teaching using online platforms. However, their efficiency is enhanced when they align with established methodological approaches, such as the sociocultural approach and task-based language teaching (hereinafter – TBLT). Although the results are partially interpreted from a neurocognitive perspective, the study did not use direct cognitive or neuroscientific procedures.*

Keywords: *digital tools; online platforms; EFL contexts; instructional models; cognitive mechanisms; self-regulation; technology-enhanced language learning.*

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1. Introduction

With the global spread of digital technologies, online platforms have become an integral part of contemporary foreign language teaching. Information and Communication Technologies (hereinafter – ICT) and language were combined, resulting in an invaluable resource for foreign language instructors (Corino et al., 2022). Subsequently, foreign language teaching has become more focused on creating ubiquitous environments that respond to students' learning needs. This gradual shift has been not only technological but also conceptual. Digital tools, particularly online platforms, can facilitate learning as a complex and socially embedded process (Su & Zou, 2022; Khezrlou, 2025). From a neurolinguistic perspective, the processing, storage, and retrieval of linguistic input are influenced by the learning environment. Thus, digitally-mediated educational settings may directly impact attention, memory, and perception of multimodal input.

In this regard, Thorne and Hellermann (2022) argue that the concept of learning should be extended and interpreted as a diverse and dynamic process focused on promoting learners' autonomy in using external tools and on developing their interpersonal skills. Furthermore, such tools facilitate the formation of sociocultural competence, enabling learners to navigate diverse learning settings. In this respect, online platforms represent both demanding and challenging educational tools (Syno et al., 2022), that foster the development of 21st-century skills. They prioritise constant interaction and collaboration among students, albeit not reducing the learner's autonomy.

After the beginning of the war in Ukraine, integrating online tools and platforms into education has become a common practice (Hasumi & Chiu, 2024). Foreign language teachers needed to react to new adverse circumstances by reviewing their approaches and teaching strategies. As a result, their roles have changed substantially, as they had to consider their students' learning skills (Vellanki & Bandu, 2021). Online platforms brought personalised learning, the selection and adaptation of learning resources, and the choice of communication methods to the fore. Meanwhile, constantly evolving and innovative digital environments pose new challenges for instructors and demand further research on these issues.

In his work, Matthews (2025) argues that, in technology-mediated language classrooms, authenticity is placed at risk as students do not distinguish between real and simulated situations. In this regard, further research is needed to examine the impact of teaching innovations on authenticity. Such research should focus on the efficiency of online platforms when implemented through different methodological approaches and their impact on learners' self-regulation and autonomy.

Thus, the present study aims to investigate innovative approaches of using online platforms in foreign language learning.

The research is relevant and promising for several reasons. First, it broadens the understanding of online platforms feasibility in socially embedded language learning classrooms complemented by digital tools. Second, the extensive use of digital tools for language learning purposes demands constant engagement, monitoring progress, and strategic use of technological resources by students. Online platforms may provide considerable benefits for developing self-regulation and learner autonomy. Meantime, they pose pending challenges regarding students' motivation and digital literacy.

Finally, the study is relevant, as both sociocultural and TBLT approaches to foreign language learning in digital environments are recognised as increasingly important. Sociocultural theory conceptualises learning as a socially embedded process involving constant interaction, collaboration, and immersion into culture. In this regard, using online platforms ensures that learners collaborate in authentic communicative environments and join diverse digital communities. These processes may also stimulate neural mechanisms, underpinning foreign language acquisition. Therefore, social interaction facilitates and reinforces better linguistic processing by potentially activating neural pathways involved in meaning comprehension and language production.

Meanwhile, TBLT approaches involve coping with clearly-defined authentic tasks which enable students to practise their language use in real-world contexts. From a cognitive perspective, applying these approaches may foster long-term procedural memory and internalisation of language structures, which are indispensable for language fluency.

Online platforms allow creating multimodal, interactive and collaborative tasks. However, they raise critical issues regarding authentic resources, encouraging participation, and the need for structured scaffolding. The present study focuses on innovative uses of online platforms through these theoretical approaches and helps clarify how digital tasks and mediated interactions can support the development of a student's foreign language competence.

While these approaches have been widely investigated from both pedagogical and sociocultural perspectives, their cognitive and neurolinguistic aspects received limited scholarly attention. Thus, the proposed study also examines the relationship between pedagogical outcomes and underlying cognitive mechanisms. The latter are of paramount importance in language acquisition. Moreover, attentional control and working memory require increased attention in both pedagogical and neurolinguistic studies as they represent key factors of cognitive processing, reasoning, and problem-solving. Thus, research into how online platforms affect these mechanisms may shed light on how digitally-mediated learning environments benefit or limit students' foreign language development.

Regardless of the fact that numerous studies have examined technology-enhanced foreign language learning, little research has been conducted addressing the effectiveness of flipped-blended classrooms, technology-enhanced task-based language teaching integrated with sociocultural principles, and traditional language instruction. The current paper is determined to fill this gap by conducting a comprehensive comparative analysis with the focus on students' communicative competences, learner autonomy, metacognitive development, and self-regulation.

2. Research methodology

The current study follows the action research cycle (Fig. 1) and uses a mixed-methods experimental design including two intervention groups and one control group. The mixed-methods approach was selected to capture both quantitative and qualitative data on foreign language learning outcomes within digital environments.

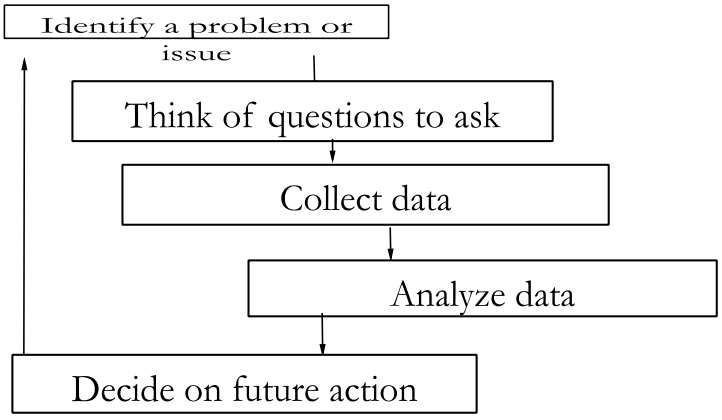

Fig. 1 An action research cycle
Source: Harmer (2015)

Action research also served as a viable method to examine how the observed outcomes and cognitive processes are interrelated. It radically differs from daily classroom observation. Unlike usual visual monitoring, it is an intentionally structured activity. Action research requires a clearly defined focus that draws the teacher's attention toward specific aspects of the foreign language learning process. Another essential element is purposeful reflection. Subsequently, observations are

conducted with the aim of getting a better understanding of the problem. In addition, the process requires keeping the record systematically. This approach helps noticing relevant and accurate details, analyse and revisit them in further instruction. The next characteristic is the continuous process of reviewing the collected data. Instructors analyse and interpret their notes to refine their understanding of the problem. Therefore, action research-based observation functions as a vital methodological tool, enabling teachers to investigate their own teaching practice analytically and to gain deeper insight into teaching-learning processes.

Context and participants. Two Ukrainian universities (Taras Shevchenko National University of Kyiv and Rivne State University of Humanities) were chosen as the research sites in order to enhance validity and reveal similarities and differences in institutional approaches to digital learning practices in EFL teaching. The first university decided to implement blended learning, whereas the second operated predominantly in online mode. 69 undergraduate students participated in the study, further split into three approximately equal groups. The research population included both pre-service English teachers and general EFL learners aged 18 to 24. The experiment lasted for one academic module (6-8 weeks) during spring semester 2025.

Participants were voluntarily recruited from students enrolled in English-language programmes. All students were required to possess at least a B2-level of English proficiency according to the Common European Framework of Reference for Languages (CEFR). Participants were informed in advance as to the purpose and research procedures before agreeing to participate. The students were not randomly separated into groups, but according to their existing academic groups. This strategy was intended to preserve the natural classroom setting and to minimise their affective filter which may have caused confusion and disruption of the regular teaching process.

The intervention groups were placed in completely different learning conditions. The first intervention group was exposed to flipped-blended language instruction comprising interactive online exercises, adaptive in-platform quizzes, synchronous speaking labs, incorporating e-portfolios followed by peer review and reflection. This model was directed towards reinforcing short-term memory by constant exposure to technology-mediated content and interacting with digital content. The second intervention group was assigned to task-based multimodal language instruction integrated with a sociocultural approach involving creating multimedia documentaries, mini research projects, online debates, online photo hunts, and virtual guided tours. These multimodal assignments were expected to enhance memory encoding and foster better processing of linguistic input. In contrast, the control group received traditional foreign language instruction characterised by teacher- and content-oriented lessons, partly mediated by technology. The suggested distribution into groups allowed revealing the ways distinct platform-enhanced approaches influence language development, learner autonomy and engagement. Comparing diverse learning conditions provides insight into the relationship between learning environments and cognitive processes underpinning language acquisition.

Instruments. The conducted experiment combined both quantitative and qualitative instruments. Quantitative data were collected using: 1) standardised pre- and post-tests evaluating both receptive and productive skills complying with CEFR-equivalent levels; 2) a learner autonomy questionnaire for tertiary EFL learners to examine metacognitive skills, strategy use and self-regulation; 3) platform analytics to track students' current performance and level of engagement; 4) a satisfaction survey using a Likert-scale to disclose learners' attitudes toward each implemented instructional model. The current study mostly used descriptive statistical procedures to summarise the obtained results. Therefore, it provides an exploratory comparison of the instructional models.

Among the qualitative instruments, semi-structured interviews with both learners and instructors appeared to be plausible, subsequent to content analysis of e-portfolios, peer-review exchanges and reflective prompts. The former helps reveal students' metacognitive awareness as well as self-regulation patterns. The use of mixed-methods approach enabled highlighting the benefits and drawbacks of each teaching model and drawing reasonable conclusions.

The study adopts the neurocognitive perspective mainly as a theoretical framework for interpreting the obtained results without administering any neurocognitive tests. Consequently, all references to cognitive and neuroscience terminology should be interpreted as theoretically informed explanations.

The study met the ethical principles guiding action research involving human beings. Before the start of observation and data collection, all participants were well-informed of its objectives, the research procedures, and their rights as the participants of the experiment. The learners were warned about possible voluntary withdrawal from the study at any stage of the experiment. The collected data remained anonymous to ensure confidentiality and protect participants' privacy.

3. The Peculiarities of Foreign Language Learning with Digital Tools

The landscape of foreign language education has undergone considerable changes due to the widespread use of digital technologies. It is characterised by creating learning spaces that differ fundamentally from traditional classroom settings. This modification increased demand for strong self-regulated learning (hereinafter – SRL). In this regard, Faza and Lestari (2025) claim that technological advancements have substantially reformed and remodeled the educational process. The authors suggest that well-developed self-regulation skills can help students maintain their motivation and realise their educational potential in online learning environments. In other words, learners must increasingly rely on their own planning and monitoring practices to succeed since teachers are not continuously physically present and there are no strictly organised classroom routines.

Modern technologies used in EFL instruction can support self-directed and collaborative learning. Fructuoso et al. (2023) state that these technologies encourage self-regulated learning as well as active social involvement, albeit they demand flexible teaching practices. This perspective contrasts with conventional teacher-centered approaches and places greater emphasis on the development of learners' skills.

Another area of foreign language education influenced by technological innovation involves the use of extended reality tools. Extended reality (hereinafter – XR) serves as an umbrella term. It includes the notions of augmented reality (hereinafter – AR), virtual reality (hereinafter – VR) and the combination of these (Chen et al., 2022). Teachers benefit from using these tools only if they are mindfully integrated into their teaching practices. As a result, interactive, enriching learning environments that simulate real-life communicative situations and increase students' motivation are created. Similarly, learners benefit from using AR in the language classroom as it opts to increase the efficiency of language teaching strategies (Wu et al., 2024). AR helps students expand their vocabulary, practice grammatical structures, and interpret cultural phenomena.

Meanwhile, VR proves to be useful for task-based instruction. However, the task should be clearly designed and address students' learning needs. Ogawa (2025) claims that students are devoid of the possibility of solving real-world problems when completing many VR-based tasks. Instead, they tend to concentrate on mere language use. Thus, the foreign language teaching strategies involving VR must be well-balanced with dual focus on the use of English and the development of real-life skills. Furthermore, students rethink the ways they access and engage with materials after constant use of XR.

Mobile learning has become especially prominent due to its portability and ubiquity. Reinders and Pegrum (2016) believe that mobile language learning generally takes two forms. The first is possible through general web browsers that provide access to mobile-designed sites or via applications from app stores. The second offers a more convenient way of interacting with learning resources, as mobile apps are faster, simpler and user-friendly learning tools (Reinders & Pegrum, 2016). Therefore, using mobile language learning tools is convenient since learners have immediate access to content.

The integration of generative artificial intelligence (hereinafter – AI) further enriches digital language learning. Matthews (2025) points out that online platforms may alter the interaction in the

classroom. The scholar suggests that students tend to use computer-generated language structures (Matthews, 2025) to fulfill the task. In this respect, the creation of learning environments saturated with AI tools raises issues of academic integrity. Thus, learners must bear responsibility for using both human- and machine-generated texts.

In summary, the digital transformation of foreign language education opens boundless possibilities compared to traditional teaching-learning formats (Onyshchak, 2022). In other words, information technologies introduce novel multifunctional approaches to EFL teaching and learning, combining interactivity, personalisation, and multimodality. Although these technologies provide opportunities for linguistic and communicative competence development, they also require the learners and teachers to develop new skills.

4. Self-Regulated and Autonomous Learning in Digital Environments

In contemporary digital foreign language learning environments, self-regulation plays an important role in achieving both personal and academic goals (Núñez et al., 2023). From a cognitive and neurolinguistic perspective, it is closely connected with attentional control, working memory, and cognitive adaptability. The latter are prerequisites for deep processing and managing linguistic input. Online platforms make students bear responsibility for their learning progress independently, boosting their cognitive skills development, and albeit emphasising collaborative knowledge accumulation. Consequently, this self-regulation mechanism in digital learning settings fosters peer collaboration (Núñez et al., 2023), thereby linking autonomy with social interaction and collective learning.

Consequently, language learning mediated by digital tools has proved to promote learner autonomy as learners adjust to new learning environments, autonomously applying their knowledge in various communicative contexts (Wach, 2012). The ability to adapt to new digital environments derives from activating neural mechanisms responsible for appropriate use of diverse learning strategies for better memory retention and processing information. Thus, students not only carry out the assignments individually, but take total responsibility for managing their own learning by choosing the best learning strategies, selecting and adapting materials, modifying types of online interaction and tracking their own progress in language mastery. However, self-regulation cannot be defined as a permanent condition (Lantolf et al., 2020). Even speakers with the highest proficiency levels ache for unrestricted accessing the initial stages of its development when faced with socially awkward communicative situations.

Mohammadi Zenouzagh et al. (2023) consider online learning environments to be spaces which require higher levels of learner autonomy on the part of students. As in online settings, learners are often required to possess well-developed time-management skills, set personal learning goals, and monitor progress without the constant presence of a teacher, this demand is constantly increasing. In other words, the responsibility for learning is transferred from the instructor to the learner. Thus, self-regulation and motivation are seen as essential components of student-centered language learning, determining the learner's academic success. Consequently, in online and blended foreign language learning settings, autonomy turns into a necessary prerequisite for effective performance and attainment.

Van Nguyen and Habók (2021) define learner autonomy taking into account students' psychological characteristics. The former state that it depends on three key principles: 1) a degree of understanding one's own abilities, the learning environment, the content, and the process of learning itself; 2) deliberate awareness of this understanding; and 3) intentional evaluation of one's learning activities. Thus, learner autonomy is a reflective process requiring both metacognitive awareness and decision-making to determine a student's learning space. From a neurolinguistic perspective, the metacognitive processes are directly interconnected with higher-order thinking skills. The latter include analysis, evaluation, and self-correction to create and adapt learning experiences to enable efficient language processing and production.

Teng (2019) outlines three components of learner autonomy: ability, desire and freedom. Ability is defined as learners' communicative competence. Desire deals with a student's motivation and determination to learn language or complete a specific task. Meanwhile, freedom refers to the level of control learners can retain in their own learning process.

Learner autonomy activated in digital settings involves the ability to monitor and regulate one's own cognitive processes effectively (Cho & Heron, 2015). For instance, the abundance of various digital resources forces students to select and adapt materials, assessing their quality. To perform this action, they need to possess well-developed critical thinking skills. As a rule, if these processes are activated in environments with multimodal input, they require continuous attention and masterful management of working memory. In addition, learner autonomy is linked to emotional and motivational self-regulation which facilitate collective engagement. The shared practices enable learners to work conjointly in planning, tracking their progress and assessing learning outcomes. The former promotes supported learning efforts in learning environments dominated by technology (Zhang et al., 2022).

In their research, Broadbent and Poon (2015) prove that, in online mode, good time-management skills contribute to students' willingness to manage their own learning process. Moreover, they examine content more critically, are more persistent in comprehending the learning material and opt for higher academic achievements. Unlike personalised learning tools, collaborative online platforms enhance self-regulation. They encourage incessant interaction between learners and teachers (Núñez et al., 2023). Students are provided with the opportunity to engage in round-table discussions and open debates. The latter foster an exchange of ideas, encouraging them to work together on shared tasks (Fructuoso et al., 2023; Liang et al., 2023).

Computer applications and various discussion forums serve the same purpose, providing spaces for learners' active participation and offering mutual support (Briones et al., 2023). Moreover, online dictionaries, grammar-checking softwares, and machine translation applications help learners explore language phenomena on their own. These technologies may enhance certain cognitive processes, such as error correction, thereby raising cognitive effort distribution. Meanwhile, social media creates opportunities for authentic communication with foreign language users (Alm, 2024).

Learners may often experience cognitive overload due to the extensive use of digital tools, dense multimodal content, and constant multitasking. From a cognitive perspective, this may directly affect memory capacity and reduce attention span. As a result, it leads to poor processing of linguistic input and rather low memory retention. Thus, the models of stable neural language processing and representation undergo radical changes.

Furthermore, the extensive use of technologies may limit learner autonomy due to the unconscious use and the lack of a definite goal. The overuse of applications hinder students' progress in developing their communicative skills. For instance, machine translators and spell checkers provide learners with ready-made digital answers without contemplation and reflection. Finally, the enormous amount of online content can contribute to cognitive overload.

5. Sociocultural and Task-Based Perspectives on Technology-Enhanced Language Learning

The use of online platforms to support foreign language instruction has increased the relevance of sociocultural and task-based theories. These perspectives may shed light on how learners interact with each other while using digital tools and resources in online environments.

From a sociocultural perspective, language is regarded as a powerful cultural instrument (Lantolf et al., 2020) that shapes a person's attitude towards the world, other people and themselves. In this regard, learners are social agents, whereas their engagement with digital online platforms is socially mediated and culturally embedded. Since they participate in online communities, create collaborative online spaces and multimodal environments, they negotiate not only linguistic competence but also sociocultural competence. This social context of online foreign language

learning concerns mainly with the notion of learner identity directly affecting the development of learner autonomy (Wach, 2012). Thus, the sociocultural approach to foreign language learning emphasises that learning in technology-rich environments is closely tied to the development of personal and social identities.

The expansion of foreign language learning with the help of online platforms unveils new contexts in which sociocultural processes unfold. Digital tools such as collaborative platforms, discussion boards, and communication applications provide spaces for learners to co-construct meaning, negotiate understanding, and scaffold one another's performance. Online interaction makes it possible for students to construct shared knowledge, foster engagement, and strengthen their collaboration. Thus, dialogic engagement, peer collaboration, and adaptive feedback are activated.

TBLT aligns with the sociocultural approach when enhanced by digital technologies. The former revolves around the clearly-set tasks used to promote authentic communication. In this respect, Mudinillah et al. (2024) states that students develop their communicative competence as a result of fulfilling definite tasks. The latter simulate real-life experiences and involve authentic language use. Consequently, these tasks are designed to draw on learners' background linguistic knowledge, activate cognitive resources, and internalise social experiences to complete communicative goals. In digital environments, this approach is enhanced as the students are exposed to utilising collaborative tools, synchronous and asynchronous online platforms, creating interactive, problem-solving, and real-world tasks.

The definition of a task is the most controversial question in TBLT. Despite different interpretations, scholars generally emphasise that any task should be meaning-oriented, communicative and directed towards developing both learner's cognitive capacities and linguistic abilities (Vellanki & Bandu, 2021). Technology-based tasks correspond to these requirements. These tasks allow learners to access enriching media input, interact in authentic contexts that mirror real-world communication, and engage in problem-solving. Moreover, learners may experience satisfaction from their own attainments (Vellanki & Bandu, 2021) while fulfilling tasks.

The roles of both teachers and learners in TBLT have considerably changed due to the integration of digital tools in foreign language instruction. Apart from being merely knowledge transmitters, educators become "facilitators" (Vellanki & Bandu, 2021). In online mode, the teacher's role lies mainly in managing digital resources, moderating online discussions, and designing complex tasks. Kim and Namkung (2024) believe that technology-enhanced TBLT contributes to "collaboration, interaction, and communication" (p. 60) in the EFL classroom, developing both student's linguistic and extralinguistic skills. Such enriching learning environments encourage learners to become autonomous in their learning while benefiting from tasks.

In addition to communicative development, technology-enhanced foreign language learning promotes cognitive, social, and metacognitive development. Liu et al. (2024) claim that students' not only develop their critical thinking and communication skills, but also raise their sociocultural awareness. Moreover, learners boost their intrinsic and extrinsic motivation, and promote deeper self-reflection. When learners work together to complete digital tasks, they engage in meaning negotiation, evaluation of alternatives, and collective problem-solving.

Despite the advantages mentioned so far, there are some obvious disadvantages. Colpaert and Spruyt (2023) state that TBLT neither concentrates on self-regulation, nor constructs learner identity. The latter becomes particularly important in online mode, as such learning presupposes using digital tools and joining various learning communities. The sociocultural approach supports TBLT, framing it as a social and personal process of learners' development. Thus, the intersection of sociocultural and task-based approaches presents a robust methodological base for understanding technology-mediated foreign language learning.

6. The Analysis and Interpretation of Research Findings on the Use of Online Platforms in EFL Instruction

The obtained results generally corroborate the previously conducted international research on the positive effects of technology used in the foreign language classroom (Broadbent & Poon, 2015; Liu et al., 2024; Núñez et al., 2023). Furthermore, the study employs a comparative analysis, suggesting that technology-enhanced task-based learning coupled with sociocultural principles may provide greater opportunities for collaborative learning, self-regulation, and autonomous decision-making. Thus, this research extends the previous one by defining the effectiveness of the three instructional models within the same educational environment.

The current study investigated how flipped-blended learning, task-based online foreign language instruction coupled with sociocultural approach and traditional teacher-centred instruction impact learners' communicative competence development, autonomy and engagement EFL learning. These different instruction models were implemented to reveal the benefits and drawbacks of each approach.

Moreover, the conducted action research made it possible to determine the efficiency of online platforms use in the EFL classroom regarding communicative competence development, learner autonomy, metacognitive skills, strategy uses and self-regulation. The mixed-methods design allowed for the triangulation of quantitative data (test scores, autonomy measures) and qualitative data (interviews, portfolio analysis, reflective prompts). This approach enriched the research as it helped identify patterns of students' cognitive engagement and self-regulation during language processing tasks.

To assess the level of students' communicative competence development according to the CEFR scale, special tests integrating tasks on both learners' receptive and productive skills were submitted. The results obtained during the pre-test are shown in percentage share of the respondents' number in Table 1.

Table 1. Expert assessment of the students' foreign language proficiency levels

Communicative competence levels	**Groups**		
	Intervention group 1	**Intervention group 2**	**Control group**
B2	63.6	69.8	66.6
C1	36.4	30.2	33.4
C2	0	0	0

Source: authors of the work

As can be seen from Table 1, the distribution across groups is consistent and the participants in the current experimental research have almost equal language level according to CEFR scale with the predominance of B2-level over C1. None of the students demonstrated C2 proficiency level. The proportion of C1-level learners (ranging between 30,2% and 36,4%) reflects typical patterns in tertiary EFL education, in which reaching C1 is desirable but not uniformly achieved.

The data of the post-test administered at the final stage of the experimental study indicate a slight increase in percentage in the three groups. However, the most significant shift towards refinement of language proficiency is seen in the intervention group 2 (to 75,7%), working according to TBLT methodology coupled with sociocultural approach. This may be due to the fact that the multimodal nature of the suggested tasks during the instruction period provided additional practice for comprehension and production. It can also be explained by constant interaction with multimodal input, which activated students' cognitive channels and facilitated deeper processing and retention of information.

The questionnaire administered to each group targeted learner autonomy, metacognitive skills, strategy use and self-regulation. The items were rated on a five-point Likert scale, where 1 equals to never and 5 stands for always. Table 2 reflects the score ranges used to classify learner autonomy as low, medium or high.

Table 2. Score ranges for autonomy learner levels

Level	Likert scale	Interpretation
Low	1-2.4	Weak autonomy, rarely uses strategies
Medium	2.5-3.4	Inconsistent strategy use, partial self-regulation
High	3.5-5	Strong autonomy, active self-regulation

Source: authors of the work

After submitting the questionnaire, obvious discrepancies in the distributional patterns across the groups were revealed. Table 3 demonstrates the percentage distribution of autonomy levels among the students in different groups.

Table 3. Students' autonomy levels (%)

Level	Groups		
	Intervention group 1	**Intervention group 2**	**Control group**
Low	9.1	31.7	36.9
Medium	39.4	22.0	50.0
High	51.5	46.3	13.1

Source: authors of the work

As the obtained data demonstrate, group 1 shows the strongest overall autonomy development level, followed by group 2. In contrast, the control group largely remains at the medium level, with the lowest proportion of high-autonomy learners. From a neuro-cognitive perspective, it showcases more efficient development of self-monitoring skills, and cognitive adaptability.

The evidence on metacognitive awareness reveals considerable differences among the three groups. The intervention group 2 demonstrates the strongest outcomes across all categories suggested for consideration. In terms of goal setting, 73% of the respondents reported that they regularly set clear learning goals, compared to 58% in group 1 and only 27% in the control group. A similar pattern is seen as to planning learning, where 70% of group 2 and 52% of group 1 planned their study hours independently, while the control group reached only 30%. The largest gap appears in progress monitoring. 76% of group 2 reported consistent monitoring of their learning progress, whereas this behaviour was typical of 49% of group 1 and only 21% of the control group. These discrepancies can be attributed to the nature of the learning environments. Beyond any doubt, the traditional instruction in the control group provided fewer opportunities for autonomous decision-making, resulting in significantly weaker metacognitive skills development. The latter are associated with higher-order cognitive skills, including the ability to choose less cognitively demanding learning strategies, proper splitting of attention, and managing memory while coping with comprehensible yet challenging language tasks.

Regarding cognitive strategy use, group 2 reached 68%, while group 1 showed 55% and the control group only 33%. The higher rate in group 2 can be explained by the fact that task-based online activities were cognitively demanding as they required learners to categorise and then revise information. Consequently, they increased students' cognitive load by demanding more active processing, evaluating, and categorising linguistic information, which resulted in strengthened memory execution and retrieval.

However, the intervention group 1 surpassed all groups in digital strategy use. 78% of learners frequently employed digital tools effectively, compared to 74% in group 2 and 36% in the

control group. The control group again displayed the weakest performance because its teacher-led lessons incorporated technology only minimally, providing fewer opportunities to develop digital literacy or independent strategy use.

Self-regulation scores indicated the advantages of platform-enhanced learning. In terms of time management, 66% of learners in the intervention group 2 reported strong abilities, compared to 48% in group 1. Only 25% in the control group demonstrated good time management skills. Regarding task completion, group 2 students were given the possibility to manage their learning independently. Similarly, 72% of group 2 learners demonstrated perseverance, coping with a difficulty. These findings suggest that the students enhanced their levels of cognitive control. For instance, they developed the ability to stay focused on the task despite increased cognitive load. Their score is much higher compared to the 55% recorded in group 1 and the 31% in the control group. It may be due to the iterative, often challenging nature of the project-based tasks suggested for completion. On the other hand, students promote their resilience and problem-solving skills by coping with demanding and challenging tasks. Interestingly, after the experiment self-reflection rise to the highest score in the intervention group 1 (63%). Group 2 (59%) and the control group (18%) demonstrated much lower results. This can be explained by the fact that the design of the flipped-blended approach requires learners to consistently assess their progress, adjust learning strategies, and identify areas for improvement through e-portfolios and peer review.

After conducting semi-structured interviews, the collected qualitative data were thoroughly analysed. They revealed considerable discrepancies in the levels of learner autonomy. The students in group 2 pointed out that they had a new experience of being constantly exposed to interactive and self-directed learning. They also stated that the project-based tasks urged them to plan, split roles, and evaluate progress within their groups. As a result, the students coped better with creating collaborative documentaries, debates, and virtual tours, heightening the feeling of responsibility for the common results. Their strategies were adjusted to overcome difficulties. The students' conduct indicates well-developed planning, monitoring, and flexible decision-making skills. Thus, they developed their cognitive flexibility, which enables productive language learning.

The instructors admitted the shift to be positive. Moreover, the students in group 2 were marked as those who increasingly initiated discussions and thoroughly selected additional resources without teachers' prompting. Peer feedback proved to be efficient in facilitating active dialogue and joint problem-solving.

The learners in group 1 demonstrated the increase in their learning autonomy level. It was possible due to the effective implementation of well-structured flipped-blended learning. The conducted interviews indicated that e-portfolios and adaptive quizzes encouraged learners to examine their learning processes more deeply. This reflection is inextricably bound with metacognitive monitoring.

Furthermore, the students collaborated daily, albeit their interaction was rather limited. Peer-reviews were quite supportive but still lacked details and precision. The instructors observed that the learners adjusted to utilising digital tools and were good at time-management. However, they did not opt to engage in collaborative activity planning. By contrast, control group students described their learning as predominantly teacher-directed. They were devoid of the possibility of planning, evaluating, or making independent decisions. Their reflections were inaccurate and peer interaction was rather limited. Furthermore, they showed lower autonomy level, did not use learning strategies properly and lacked self-regulation skills. Consequently, their cognitive engagement was relatively low concerning attentional control and language processing.

Although the results partially overlap contemporary cognitive and neurolinguistic theories of technology-enhanced language learning, the present research did not directly address these frameworks. Therefore, any interpretation of terminology remains theoretical and was used to support the main results and observations.

7. Conclusion

The study results suggest that integrating online platforms into foreign language instruction brings tangible results in terms of cognitive processing and self-regulation. These digital tools substantially alter the traditional roles of both learners and teachers. Both approaches realised in the intervention groups helped instructors create dynamic, interactive learning environments that stimulate attention control and memory retrieval. They enhanced students' levels of learner autonomy, self-regulation, and communicative competence. The results of the current research clearly show that online platforms serve as an indispensable tool for collaboration, reflection, and meaningful task completion in the EFL classroom. As a result, students become more active participants in their learning processes, use resources strategically, activate their cognitive mechanisms, and can regulate their own progress.

Group 2 consistently outperformed the other groups in terms of communicative competence, metacognition, strategy use, and self-regulation. The former was exposed to the cognitively challenging, collaborative, and socially mediated learning conditions inherent in TBLT. The tasks required learners to be decisive, plan and structure their work logically, adjust learning strategies to the learning conditions, and maintain constant cognitive engagement.

Group 1 also demonstrated fruitful results in learner autonomy levels, digital strategy use and self-reflection. The former underwent structured and tool-rich flipped-blended instruction. The teachers steadily guided their learners in digital learning activities and supported them through reflection cycles, calling for more learner autonomy. In contrast, the control group consistently showed the lowest autonomy levels. The reason for this may be the absolutely teacher-led instruction which provided limited opportunities for independent planning and peer collaboration.

The prospects for further research are determined by the increasing need of conducting the deeper analysis of motivational strategies realised in both online and face-to-face learning settings with the integration of modern online platforms.

8. Limitations

One of the key limitations of the present action research lies in its relatively context-dependent nature as it was conducted in two specific university settings with distinct instructional strategies, technological capacities and foreign language learning traditions. Consequently, its conclusions should be interpreted with caution when applied to markedly different educational environments.

The present study employed descriptive statistical analyses to summarise the obtained results. Consequently, the findings reveal meaningful differences among the instructional groups. However, to add more validity to the research, inferential statistical procedures should be implemented in the future.

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The authors of the current study took shared responsibility for its preparation. Authors A and B thoroughly compiled and analysed theoretical sources on digital EFL learning, learner autonomy and self-regulation, the differences between traditional and ICT-mediated instruction. Author C focused on the specificity of online platforms to supplement sociocultural and TBLT approaches. Authors D and E worked out the action research methodology and categorised the obtained quantitative and qualitative data, interpreting them. Finally, Author F was responsible for editing the manuscript and its verification.

Authors Integrity Statement

We declare that this manuscript is the original work prepared without AI tools. The ideas presented in it are formulated by us and all the sources used are acknowledged in accordance with academic and ethical standards.

References

Alm, A. (2024). Exploring autonomy in the AI wilderness: Learner challenges and choices. *Education Sciences, 14*(12), Article 1369. https://doi.org/10.3390/educsci14121369

Briones, M. R., Prudente, M., & Errabo, D. D. (2023). Characteristics of Filipino online learners: A survey of science education students' engagement, self-regulation, and self-efficacy. *Education Sciences, 13*(11), Article 1131. https://doi.org/10.3390/educsci13111131

Broadbent, J., & Poon, W. L. (2015). Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The Internet and Higher Education, 27*, 1–13. https://doi.org/10.1016/j.iheduc.2015.04.007

Chen, J., Dai, J. S., Zhu, K., & Xu, L. (2022). Effects of extended reality on language learning: A meta-analysis. *Frontiers in Psychology, 13*, Article 1016519. https://doi.org/10.3389/fpsyg.2022.1016519

Cho, M.-H., & Heron, M. L. (2015). Self-regulated learning: The role of motivation, emotion, and use of learning strategies in students' learning experiences in a self-paced online mathematics course. *Distance Education, 36*(1), 80–99. https://doi.org/10.1080/01587919.2015.1019963

Colpaert, J., & Spruyt, E. (2023). Conceptualisation of a language task design model for mental acceptance. In A. Potolia & M. Derivry-Plard (Eds.), *Virtual exchange for intercultural language learning and teaching: Fostering communication for the digital age* (pp. 44–66). Routledge. https://doi.org/10.4324/9781003024620-3

Corino, E., Fissore, C., & Marchisio, M. (2022). Adaptive exercises and formative assessment for English remedial action. In D. Ifenthaler, P. Isaías, & D. G. Sampson (Eds.), *Orchestration of learning environments in the digital world* (pp. 3–19). Springer. https://doi.org/10.1007/978-3-030-90944-4_1

Faza, A., & Lestari, I. A. (2025). Self-regulated learning in the digital age: A systematic review of strategies, technologies, benefits, and challenges. *The International Review of Research in Open and Distributed Learning, 26*(2), 23–58. https://doi.org/10.19173/irrodl.v26i2.8119

Fructuoso, I. N., Robalino, P. E., & Ahmedi, S. (2023). The flexibility of the flipped classroom for the design of mediated and self-regulated learning scenarios. *RIED. Revista Iberoamericana de Educación a Distancia, 26*(2), 155–173. https://doi.org/10.5944/ried.26.2.36035

Harmer, J. (2015). *The practice of English language teaching* (5th ed.). Pearson Education Limited.

Hasumi, T., & Chiu, M. S. (2024). Technology-enhanced language learning in English language education: Performance analysis, core publications, and emerging trends. *Cogent Education, 11*(1), Article 2346044. https://doi.org/10.1080/2331186X.2024.2346044

Kim, Y., & Namkung, Y. (2024). Methodological characteristics in technology-mediated task-based language teaching research: Current practices and future directions. *Annual Review of Applied Linguistics, 44*, 56–78. https://doi.org/10.1017/S0267190524000096

Khezrlou, S. (2025). Task-based language teaching. In G. Stockwell & Y. Wang (Eds.), *The Cambridge handbook of technology in language teaching and learning* (pp. 377–392). Cambridge University Press. https://doi.org/10.1017/9781009294850.028

Lantolf, J. P., Poehner, M. E., & Thorne, S. L. (2020). Sociocultural theory and L2 development. In B. VanPatten, G. Keating, & S. Wulff (Eds.), *Theories in second language acquisition: An introduction* (3rd ed., pp. 223–247). Routledge.

Liang, Y., Ren, L., Wei, C., & Shi, Y. (2023). The influence of internet-specific epistemic beliefs on academic achievement in an online collaborative learning context for college students. *Sustainability, 15*(11), Article 8938. https://doi.org/10.3390/su15118938

Liu, Y., Thurston, A., & Ye, X. (2024). Technology-enhanced cooperative language learning: A systematic review. *International Journal of Educational Research, 124*, Article 102314. https://doi.org/10.1016/j.ijer.2024.102314

Matthews, B. (2025). Artificial worlds and artificial minds: Authenticity and language learning in digital lifeworlds. *Journal of Responsible Technology, 23*, Article 100131. https://doi.org/10.1016/j.jrt.2025.100131

Mohammadi Zenouzagh, Z., Admiraal, W., & Saab, N. (2023). Learner autonomy, learner engagement and learner satisfaction in text-based and multimodal computer mediated writing environments. *Education and Information Technologies, 28*, 14283–14323. https://doi.org/10.1007/s10639-023-11615-w

Mudinillah, A., Rahmi, S. N., & Taro, N. (2024). Task-based language teaching: A systematic review of research and applications. *Lingeduca: Journal of Language and Education Studies, 3*(2), 102–115. https://doi.org/10.70177/lingeduca.v3i2.1352

Núñez, M. E., García, P. M., & Abbas, A. (2023). The mediating role of self-regulation between emotional intelligence and student performance in online global classroom-based collaborative international online learning (COIL): Empirical evidence from four partner universities of Latin America. *Research in Globalization, 7*, Article 100178. https://doi.org/10.1016/j.resglo.2023.100178

Ogawa, K. (2025). Development of task-based language teaching in virtual reality: A case study. *Technology in Language Teaching & Learning, 7*(3), 1–36. https://doi.org/10.29140/tltl.v7n3.102540

Onyshchak, H. (2022). Emergency distance language learning in the conditions of the COVID-19 pandemic and war in Ukraine. In E. Augustínová & V. Mažgútová (Eds.), *Changes and challenges of increasing the quality of preparation of prospective teachers in European countries 2022* (pp. 102–109). Žilinská univerzita. https://dspace.uzhnu.edu.ua/server/api/core/bitstreams/695096e2-8b04-4109-abfa-ae2e17c8e3d5/content

Reinders, H., & Pegrum, M. (2016). Supporting language learning on the move: An evaluative framework for mobile language learning resources. In B. Tomlinson (Ed.), *Second language acquisition research and materials development for language learning* (pp. 221–233). Routledge. https://doi.org/10.4324/9781315749082

Su, F., & Zou, D. (2022). Technology-enhanced collaborative language learning: Theoretical foundations, technologies, and implications. *Computer Assisted Language Learning, 35*(8), 1754–1788. https://doi.org/10.1080/09588221.2020.1831545

Syno, V., Turchyn, A., Syvyk, O., Glotov, O., Krut, O., & Babii, L. (2022). Distance learning of a foreign language: A comparative analysis of modern platforms and online services. *Revista Romaneasca Pentru Educatie Multidimensionala, 14*(2), 461–478. https://doi.org/10.18662/rrem/14.2/590

Teng, M. F. (2019). *Autonomy, agency, and identity in teaching and learning English as a foreign language*. Springer. https://doi.org/10.1007/978-981-13-0728-7

Thorne, S. L., & Hellermann, J. (2022). Interfacing formal education and language learning beyond the classroom. In H. Reinders, C. Lai, & P. Sundqvist (Eds.), *The Routledge handbook of language learning beyond the classroom* (pp. 36–51). Routledge. https://doi.org/10.4324/9781003048169-5

Van Nguyen, S., & Habók, A. (2021). Designing and validating the learner autonomy perception questionnaire. *Heliyon, 7*(4), Article e06831. https://doi.org/10.1016/j.heliyon.2021.e06831

Vellanki, S. S., & Bandu, S. (2021). Engaging students online with technology-mediated task-based language teaching. *Arab World English Journal (AWEJ) Special Issue on Covid 19 Challenges*, 107–126. https://doi.org/10.24093/awej/covid.8

Wach, A. (2012). Computer-mediated communication as an autonomy-enhancement tool for advanced learners of English. *Studies in Second Language Learning and Teaching, 2*(3), 367–389. https://doi.org/10.14746/ssllt.2012.2.3.6

Wu, J., Jiang, H., & Chen, S. (2024). Augmented reality technology in language learning: A meta-analysis. *Language Learning & Technology, 28*(1), 1–23. https://doi.org/10.64152/10125/73596

Zhang, Z., Gao, X. (Andy), Liu, T., & Lee, C. B. (2022). Language learners' emotion regulation and enjoyment in an online collaborative writing program. *Studies in Second Language Learning and Teaching, 12*(3), 459–481. https://doi.org/10.14746/ssllt.2022.12.3.6