INCLUSIVE ASSESSMENT PRACTICES USING VR AND AR TECHNOLOGIES IN ENGLISH LANGUAGE LEARNING

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Abstract: This study explores the potential of Virtual Reality (VR) and Augmented Reality (AR) technologies to enhance inclusive assessment practices in English language learning. The primary objective was to identify how immersive and interactive environments can provide fairer and more flexible assessment opportunities for students with diverse learning needs and abilities. The research employed a qualitative review of recent literature combined with classroom-based trials of VR/AR applications, including simulated communicative tasks and AR-enhanced exercises. Data were gathered through teacher–student observations and feedback from learners with different educational needs. Findings indicate that VR simulations enable students to demonstrate communicative competence in authentic scenarios, such as ordering food or navigating travel situations, while AR tools support multimodal assessment by integrating pronunciation models, visual markers, and contextual vocabulary. These approaches proved particularly effective for students with dyslexia, autism spectrum conditions, or hearing impairments, as adaptive features such as subtitles, haptic signals, and customizable interfaces facilitated participation. Moreover, VR/AR assessments were found to reduce test-related anxiety, increase motivation, and encourage the use of real communication strategies rather than rote responses. The study highlights the significance of VR and AR in fostering inclusive, differentiated, and student-centered assessment in English language education. By aligning evaluation with real-life communicative tasks, these technologies not only promote equity but also strengthen learners' confidence, motivation, and intercultural competence. The findings suggest that integrating VR/AR into assessment design holds considerable potential for the future of English language pedagogy.
Keywords: inclusive assessment, English language learning, virtual reality, augmented reality, communicative competence

1. INTRODUCTION

In the context of globalization, the English language has acquired the status of a lingua franca, serving as the main medium of intercultural communication, international collaboration, academic exchange, and access to global knowledge resources. Today, proficiency in English is not limited to the mastery of grammar and vocabulary; it encompasses the ability to apply communicative competence in diverse professional, educational, and social domains. Therefore, the process of teaching and, most importantly, assessing English language skills requires the creation of fair, flexible, and inclusive approaches that take into account the diversity of learners. Traditional forms of assessment such as standardized tests, written assignments, and oral examinations often operate on the assumption that all learners have similar learning styles, cognitive abilities, and socio-cultural backgrounds. These methods tend to measure language knowledge in rigid formats, thereby overlooking individual needs, diverse competencies, and alternative ways of demonstrating linguistic proficiency. For students with special educational needs, learning difficulties, or different cultural and linguistic backgrounds, such traditional systems frequently become a barrier rather than a facilitator of progress. This

situation has led to an increasing scholarly focus on inclusive assessment practices, which aim to provide equitable opportunities for all learners, regardless of their personal conditions or learning differences.

In recent decades, the emergence of information and communication technologies (ICT) has profoundly influenced the field of education. Among them, immersive technologies such as Virtual Reality (VR) and Augmented Reality (AR) represent a particularly promising direction for language pedagogy. VR allows learners to engage in simulated, interactive environments that closely resemble real-life communicative contexts. For example, learners can participate in a role-play situation such as booking a hotel room, negotiating a business deal, or traveling through an airport, all within a controlled yet realistic environment. Such simulations foster the spontaneous use of language, encourage problem-solving, and provide authentic opportunities to apply vocabulary, grammar, and discourse strategies. AR, in contrast, overlays digital information onto real-world objects, thereby enriching the learning experience with multimodal input. Through AR applications, students may visualize English words linked to classroom objects, listen to their pronunciation, or even receive contextual translations. This creates an environment where the boundaries between abstract linguistic knowledge and its real-life application are minimized. The interactive, multisensory nature of AR makes it particularly effective for visual and kinesthetic learners, as well as for students who benefit from differentiated instruction. From the perspective of inclusivity, both VR and AR technologies have the potential to transform assessment practices. Unlike traditional tests that measure memorized knowledge under time pressure, VR/AR-based assessments allow for the demonstration of language competence in dynamic, situational tasks. This includes spoken interactions, collaborative projects, problem-solving activities, and multimedia tasks that reflect the complexity of real-life communication. Furthermore, VR/AR environments can be adapted to accommodate learners with different needs: for example, offering subtitles or visual cues for hearing-impaired students, adjustable text settings for students with dyslexia, or simplified interactive modes for learners with attention or sensory difficulties.

Another critical advantage of using VR and AR in assessment lies in their ability to reduce test-related anxiety and enhance learner motivation. In traditional assessment contexts, students often experience stress, fear of failure, or communication barriers in front of examiners. By contrast, VR/AR simulations immerse learners in authentic but low-risk environments where mistakes are viewed as part of the learning process rather than as final failures. This not only promotes a growth mindset but also enables more accurate evaluation of communicative competence, creativity, and problem-solving strategies. Moreover, the use of VR and AR supports the principles of formative assessment. Since these technologies can track learner interactions in detail—such as response times, choice of vocabulary, turn-taking in dialogue, and use of clarification strategies—teachers can provide timely, individualized feedback. This data-driven approach ensures that assessment is not limited to a single score, but rather becomes an ongoing process aimed at developing learner autonomy and self-reflection. In addition, peer assessment can be incorporated into VR/AR tasks, allowing students to critically evaluate each other's communicative strategies, which further strengthens the collaborative dimension of learning. Thus, the integration of VR and AR into English language education responds to two urgent needs of modern pedagogy: first, to create inclusive and equitable assessment systems that respect the diversity of learners,

and second, to utilize innovative technologies that align educational practices with the demands of the 21st century. By combining authenticity, interactivity, and adaptability, VR and AR offer new horizons in measuring not only linguistic knowledge but also the broader communicative competence required in real-world contexts.

2. LITERATURE REVIEW

Issues of inclusive assessment in language education have been rapidly developing in the last decade, reflecting the growing global interest in ensuring equal opportunities for all learners regardless of their physical, cognitive, or social differences. Researchers argue that traditional methods of assessment, which often rely heavily on written examinations and standardized tests, may fail to capture the real communicative abilities of students with diverse needs. For this reason, new approaches have been suggested, with a particular focus on formative assessment, differentiated strategies, and the integration of modern digital tools. Black and William (2018) emphasize the advantages of formative assessment in taking into account the individual needs of students, noting that traditional summative assessment methods often do not provide a fair result. According to their findings, assessment should not only be a tool for measuring knowledge but also serve as a process of supporting learning, guiding students through feedback, and adapting teaching strategies to their personal needs. This perspective is particularly relevant in inclusive education, where learners with disabilities or special educational needs may require different types of support and demonstration of knowledge. Tomlinson (2019) demonstrates that differentiated assessment models are highly effective in addressing the needs of heterogeneous classrooms. He argues that a "one-size-fits-all" approach in education does not adequately reflect the learning pace, styles, and cognitive abilities of students. Instead, the adoption of flexible assessment models—such as project-based evaluation, oral presentations, and multimodal tasks—can create fairer and more inclusive conditions. Differentiated assessment not only helps learners demonstrate their skills in various ways but also increases motivation, as students are allowed to showcase their knowledge in a manner aligned with their strengths.

At the same time, researchers increasingly recognize the role of advanced technologies such as Virtual Reality (VR) and Augmented Reality (AR) in enhancing inclusivity. There are many studies on the role of VR technologies in education, particularly in second language acquisition. Johnson (2020), for example, found that students effectively developed their communicative skills in the "virtual city" environment created on the basis of VR when learning English. Within this environment, learners could interact in authentic scenarios—such as shopping, asking for directions, or engaging in casual social communication—which closely replicated real-life communicative demands. The immersive nature of VR gave students the opportunity to practice language use without the anxiety often associated with traditional classroom settings. Similarly, Lee and Chen (2021) report that the use of AR applications significantly enhances visual perception, improves pronunciation, and accelerates the memorization of new words. Their study illustrates how AR tools, by overlaying digital objects or information in real-world contexts, help students connect abstract vocabulary with concrete experiences. For instance, pointing a smartphone at an object and immediately seeing its English label creates a stronger memory association than rote memorization. In this sense, AR functions not only as a learning tool but also as an alternative assessment method,

as students' performance can be observed in spontaneous interaction with digital prompts.

In the context of inclusive education, VR and AR technologies are being studied separately as well as in integrated forms. Brown's (2022) study is particularly noteworthy, as it demonstrates that VR-based interactive tasks for students with special needs were significantly more effective than traditional tests. For example, students with dyslexia, who often face challenges in completing reading or writing assignments, were able to demonstrate their communicative competence more successfully in immersive VR environments. Instead of being disadvantaged by their difficulties with text-based tasks, they could participate in role-play activities and respond orally, thereby showing their actual language abilities. Regional studies also contribute to the discussion. Akhmedova (2023), based on her research in Uzbekistan, notes that students of different ages quickly master pronunciation using AR applications. She emphasizes that learners express themselves more freely in oral interactive exercises compared to written assessments, as digital tools reduce anxiety and create an engaging environment. The findings from this study are especially relevant for multilingual and multicultural contexts, where learners may face additional challenges in language acquisition.

The literature further underlines the motivational aspects of integrating VR and AR technologies into assessment practices. Smith and O'Reilly (2022) argue that English language exams conducted in VR environments tend to result in higher participation and better performance. The immersive, game-like nature of VR creates a sense of being in real-life situations, which reduces examination stress and fosters authentic language use. When learners perceive the assessment environment as less threatening, they are more likely to engage actively and demonstrate their true abilities. This is crucial in inclusive settings, where students often experience test anxiety due to prior negative experiences with traditional assessment methods. Additionally, several scholars highlight the broader pedagogical implications of inclusive digital assessment. For instance, some studies suggest that VR and AR not only facilitate fairness in evaluation but also encourage collaborative learning, peer interaction, and cultural awareness. By simulating intercultural communication scenarios, students can practice not just linguistic competence but also pragmatic and socio-cultural aspects of communication. In this sense, inclusive assessment through VR/AR is not limited to testing individual language knowledge but extends to preparing students for real-world communication challenges.

3. METHODOLOGY

This study was aimed at identifying the possibilities of ensuring inclusivity in the assessment process through the use of VR and AR technologies in teaching English. In order to achieve this objective, a multi-stage methodological approach was applied. First, a comprehensive analysis of existing scientific literature, international best practices, and previous research on inclusive assessment was carried out. This literature review provided a theoretical and conceptual framework for understanding how VR and AR tools can contribute to inclusivity in language learning assessment. Second, simulation-based tasks and interactive exercises created with the help of VR and AR applications were integrated into the English language learning process. These tasks were designed not only to evaluate linguistic competence, such as vocabulary acquisition, pronunciation, and communicative fluency, but also to measure learners' engagement, adaptability, and overall learning experience. The

simulations aimed to provide equal opportunities for all learners, including those with diverse needs, by offering a personalized and immersive environment. Third, qualitative methods were employed through structured and semi-structured conversations with English teachers, as well as classroom observations. Interviews and discussions with students of different backgrounds and abilities were conducted to identify their perceptions, challenges, and feedback regarding the use of VR and AR in assessment. Special attention was given to the experiences of learners with disabilities or learning difficulties, as their perspectives provided valuable insights into the inclusivity of the process. Finally, the collected data were systematically analyzed to highlight the effectiveness of VR- and AR-based assessment methods. The analysis focused on both the pedagogical outcomes—such as improved motivation, fairness in assessment, and enhanced learner autonomy—and the practical challenges, including technical limitations, teacher preparedness, and accessibility issues. This methodological triangulation ensured that the findings of the study were both reliable and representative, combining theoretical research, experimental testing, and practical observations.

4. RESULTS AND DISCUSSION

In the course of the study, it was found that assessment practices using VR and AR technologies significantly enhance inclusivity, fairness, and flexibility in learning English. The integration of immersive simulations and digital augmentation created conditions where learners were able to demonstrate their communicative skills in a natural, context-sensitive manner. Unlike traditional assessment, which often prioritizes memorization and the reproduction of fixed answers, VR/AR-based evaluation focused on communicative competence, adaptability, and the ability to negotiate meaning in real time. Simulations close to real life, organized in the VR environment, allowed students to demonstrate listening, speaking, reading, and writing in the flow of interaction. Beyond airport check-ins, business conversations, hotel reservations, and client negotiations, learners handled unplanned turns in situations such as resolving a lost-luggage claim, clarifying a double booking at a hotel desk, or correcting a billing error after a restaurant meal. In these encounters, scoring moved from a binary correct–incorrect logic toward evaluating how effectively students sustained interaction through clarification requests, confirmation checks, mitigation strategies, and appropriate register. This shift from product-oriented evaluation to process-oriented observation yielded performances that were more authentic for high-stakes communicative tasks. AR further expanded multimodal assessment by binding language to context in real time. When students practiced a campus tour, AR anchors attached to landmarks prompted situated vocabulary, direction-giving sequences, and micro-presentations; mispronunciations triggered subtle visual cues to retry rather than halting the task. In pronunciation work, waveform overlays and syllable-timing guides individualized practice so that learners compared their output to a model without the stigma of public correction. In reading-to-write tasks following a VR museum visit, AR hotspots on exhibit labels surfaced key terms, short audio glosses, and citation snippets that students then integrated into a critique. The immediate, targeted feedback from these overlays helped learners not only identify errors but also select corrective strategies—rephrasing, slowing down, or inserting signposting language—turning assessment moments into teachable moments.

Adaptation for diverse needs was central to the observed gains. For learners with dyslexia, AR text layers supported chunked decoding, adjustable spacing, and color contrasts, while text-to-speech options reduced working-memory load during dense instructions. Rubrics placed emphasis on comprehension—summarizing main ideas, inferring implied meanings, and connecting facts—rather than speed alone. Hearing-impaired learners used live captions and icon-based cues to manage turn-taking; where appropriate, responses were accepted in sign or typed modalities with equivalent scoring descriptors to preserve construct coverage without privileging a single channel. Learners with attention-regulation challenges benefited from scenarios broken into brief, clearly marked stages with progress indicators and micro-goals; haptic nudges and short reflective pauses encouraged self-monitoring without penalizing pace. For autistic learners, reduced-stimulus scenes and predictable turn sequences minimized sensory strain, while AR social prompts supported polite refusals, hedging, and escalation from informal to formal register. Students with physical limitations navigated scenes through voice or gaze controls, and every task had a 2D alternative preserving the same linguistic demands. Low-vision options—high contrast, scalable fonts, and audio descriptions of visual prompts—ensured parity in access to core task information. Motivation and engagement rose as learners reframed simulations as meaningful tasks rather than exams. In a restaurant service-recovery scenario, a learner who misordered proactively repaired the interaction by apologizing, reformulating the request, and negotiating compensation; the rubric rewarded the quality of repair and the maintenance of rapport, resulting in a fairer portrait of competence than traditional error tallies. In a public transport scenario, students asked for route advice, handled an unexpected service disruption, and then wrote a brief message to a classmate explaining the revised plan; the oral and written components were scored coherently as a single communicative episode. Following a VR panel on sustainable tourism, learners produced a summary–response paragraph using AR citation cards to attribute claims accurately; this inter-skill linkage elicited synthesis and evaluation rather than isolated sentence-level accuracy. Peer assessment became more substantive when students exchanged short VR recordings and applied shared criteria that emphasized whether communicative goals were achieved—was the complaint resolved, was the direction intelligible, did the refusal preserve face—rather than merely noting grammatical slips. Shy or socially anxious students valued the option to review annotated recordings privately and retake tasks after targeted feedback, and their second attempts typically displayed clearer structuring moves, more strategic clarification, and steadier pace.

Process analytics collected by the platforms enriched formative feedback. Logs captured turn distribution, mean utterance length, pausing behavior, lexical variety and collocation use, and the frequency and timing of repair initiations. Teachers used timestamped comments to highlight strengths such as effective softening before disagreement or judicious code-switching for a single technical term followed by immediate self-repair. These data informed individualized learning plans—for example, setting a goal to add a confirmation check after complex directions, or to preface advice with stance markers to soften authority. Over time, repeated engagements with similar but not identical scenarios made growth visible in ways that traditional single-shot tests seldom allow, since learners could compare earlier and later performances on the same communicative function under slightly varied conditions. Fairness and construct validity improved when tasks mirrored real-world practices while keeping interface demands minimal. A short orientation mode

equalized familiarity with controls before scoring began, ensuring that button navigation did not confound linguistic performance. Because automatic speech recognition sometimes misinterpreted non-standard accents or rapid code-switching, final judgments blended machine transcriptions with human ratings anchored to exemplars and clearly articulated descriptors. Rater calibration sessions using anonymized clips reduced idiosyncratic scoring; double-marking of border-line performances and adjudication protocols further stabilized outcomes. To preserve academic integrity without narrowing the construct, scenario banks rotated and included small but meaningful variations—changing an airline policy detail, a menu constraint, or the customer service complaint—so that memorized scripts were less useful than transferable strategies. In AR tasks, the sequence of prompts and the spatial placement of QR anchors varied by session, which discouraged sharing of answer paths while preserving the same underlying communicative demands.

Operationally, constraints around device availability and bandwidth were addressed through rotational scheduling, strict hygiene routines for headsets, and a standing option to switch to a 2D mirror without penalty for motion-sensitive users. Offline AR packs and lightweight VR scenes maintained continuity during unstable connectivity. To curb teacher workload and improve scoring consistency, standardized rubrics, scenario templates, and an auto-feedback bank for frequent issues were embedded into the system; short tutorial videos and just-in-time tooltips supported both instructors and learners. Privacy and ethics were safeguarded through informed consent, anonymized identifiers, restricted access to recordings, and clear retention and deletion policies communicated at the outset, which increased learner trust and willingness to participate fully. Additional evidence of inclusivity emerged in group-based tasks. In a collaborative travel-planning simulation, triads negotiated an itinerary within budget and time constraints, then presented a joint rationale; assessment captured equitable participation, turn-management, and consensus-building language alongside accuracy. In a healthcare appointment role-play, learners described symptoms, interpreted dosage instructions, and reformulated medical advice for a family member; the rubric credited plain-language explanations and safety-check questions, not merely medical vocabulary recall. In a housing inquiry by phone, students asked follow-up questions about lease terms, clarified unfurnished versus furnished conditions, and wrote a short follow-up message; successful performances showed control of politeness formulas, sequencing of questions, and concise written recap. Across proficiency levels, tasks scaled in complexity—from short direction-giving with confirmation checks to handling multi-party meetings where learners justified recommendations, hedged claims, and responded to unanticipated objections—yet the assessment lens remained stable: purposeful communication, strategic behavior, intelligibility, and pragmatic fit.

Although novelty effects and varying teacher confidence with technology can influence initial outcomes, these were mitigated through brief orientation, opportunities for low-stakes practice, and a gradual release from scaffolded to freer tasks. Importantly, the system preserved multiple response modalities so that the measured construct remained communicative ability rather than device dexterity. Where learners preferred to plan briefly, AR micro-whiteboards allowed discrete pre-task note-making without advantaging extensive drafting, maintaining fairness across planning styles. Taken together, the findings indicate that well-designed VR/AR-based assessment reframes evaluation as a developmental, evidence-rich

process that privileges goal-achievement, interactional competence, and pragmatic appropriateness while still attending to accuracy. By aligning tasks with authentic communicative purposes, offering accessible pathways for diverse learners, and combining analytics with expert judgment, the approach produced a more equitable and instructionally useful portrait of ability than traditional formats. Practical measures—calibration, scenario rotation, ethical safeguards, and teacher support—were essential to sustaining reliability and feasibility at scale. As implementation matures, the continued refinement of rubrics, the expansion of scenario libraries, and the integration of longitudinal progress views are likely to further strengthen both the inclusivity and the validity of language assessment in VR/AR environments

5. CONCLUSION

This study demonstrated the crucial role and effectiveness of using VR (Virtual Reality) and AR (Augmented Reality) technologies in the development of inclusive assessment practices in English language learning. The findings suggest that these innovative tools not only contribute to the consolidation of students' linguistic knowledge but also help establish a more comfortable, motivating, and equitable learning environment for learners with diverse needs and abilities. The analysis confirmed that simulations created through VR provide learners with a close-to-real communication experience, enabling them to engage with foreign interlocutors in an immersive context. At the same time, AR technologies enrich the learning process with authentic real-life scenarios, which significantly improves memory retention and facilitates the practical application of language skills. This shows that the use of immersive technologies makes the learning process not only more engaging but also pedagogically more effective. From the perspective of inclusive assessment, VR and AR applications ensure a more flexible and personalized approach compared to traditional testing systems. Learners with speech difficulties, special educational needs, or anxiety-related challenges can demonstrate their knowledge in a safe virtual environment, thereby reducing psychological barriers and allowing for more accurate evaluation of their abilities. Furthermore, these technologies enable multimodal assessment, allowing teachers to assess not only the learners' writing and speaking skills but also their communicative competence, problem-solving strategies, and adaptability in interactive tasks.

In a broader sense, integrating VR and AR into assessment practices represents a significant step towards promoting equality, diversity, and inclusiveness in English language education. By enhancing motivation, ensuring fairness, and addressing individual needs, these technologies create conditions for a more just and student-centered educational system. However, the study also highlights the need for continuous improvement, including teacher training, resource availability, and methodological support to ensure the sustainable use of immersive technologies in education. Therefore, in the future, one of the key tasks for researchers and educators will be the systematic expansion of VR and AR integration in English language teaching and assessment. This includes not only their application in pilot projects but also the development of unified methodological frameworks, policies, and standards that can make these technologies an inseparable part of inclusive education. With the advancement of digital tools, VR and AR are expected to evolve into powerful instruments that shape a more equitable, motivating, and effective language learning environment for all students, regardless of their background or individual challenges.

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