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AR/VR DIGITAL STORYTELLING IN HIGHER EDUCATION FOREIGN LANGUAGE INSTRUCTION

The rapid proliferation of Augmented Reality (AR) and Virtual Reality (VR) technologies in educational settings has created novel opportunities for immersive, multimodal foreign language instruction. Grounded in constructivist, experiential, and sociocultural theories, this study investigates how AR/VR-enabled digital storytelling can enhance foreign language learning outcomes in higher education. The problem context arises from the need to move beyond traditional text-based or screen-based multimodal approaches toward more immersive, interactive environments that align with contemporary students' digital literacies and motivation profiles. Empirical findings from recent literature indicate that immersive narratives in virtual or augmented settings can foster deeper vocabulary retention, pragmatic competence, speaking fluency, and critical thinking, while also sustaining emotional and behavioural engagement. Platforms such as CoSpaces Edu, Mozilla Hubs, Storyfab, and ExpeditionsPro illustrate practical implementations, enabling students to co-create virtual scenarios (e.g., simulated travel, cultural exchanges, professional role-plays) where they interact with peers, virtual agents, and digital artifacts in the target language. The article addresses challenges including technological access, usability constraints, instructor digital novice anxiety, and resistance to innovation, emphasizing the necessity for structured scaffolding, professional development, and institutional support. Implications for pedagogical design involve developing design frameworks that align AR/VR storytelling tasks with specific language objectives and assessment criteria, ensuring manageable cognitive load, and facilitating inclusive practice through mobile-based or browser-based alternatives. The study contributes to evidence-based understanding of how AR/VR digital storytelling can transform foreign language pedagogy in higher education, advancing learners' linguistic proficiency, digital agency, and intercultural awareness.

Key words: *Augmented Reality (AR), Virtual Reality (VR), Digital Storytelling, Immersive Learning, Multimodal Literacy, methodological innovation, modern pedagogical technologies.*

Problem statement. Augmented Reality (AR) and Virtual Reality (VR) applications have grown tremendously in almost all domains and thus have remarkably impacted various sectors like learning, teaching, attitude, and community skills. AR is a technology that overlays digital content (images, text, audio, or 3D models) onto the real-world environment through devices like smartphones, tablets, or AR glasses [8, p. 168–172]. VR enables users to create real-world properties and scenarios artificially engrossed in the 3D world, interacting with virtual objects and exploring a fully immersive computer-generated environment [1, p. 2].

Scholars have widely promoted multimodal social semiotic view of communication with a strong accent on the multimodality of semiotic resources comprising the linguistic, audio, visual, gestural, and spatial modes [6]. In teaching practices, storytelling is seen as an experiential state of immersion in which all mental processes are concentrated on the events occurring in the narrative [3, p. 68]. In foreign language communication, narrative ability is defined as one of the essential educational outcomes. In current educational contexts, the knowledge-sharing process is deeply grounded on mastering digital technology and multimedia literacy. Recent studies acknowledge digital narratives as a multidimensional immersive educational construct ensuring students' active participation and involvement in learning activities via agentive, emotional, cognitive, behavioural, and social engagement [4, p. 1–4].

Analysis of recent research and publications. Prior studies have employed multimodality in developing learners' language competency. Wayan Eka Dian Rahmanu and Gyöngyvér Molnár, in the systematic review of 34 research articles published from 2013 to 2024 in Web of Science and Scopus, assume the authors' focus on the beneficial use of multimodality in improving aspects of English language learners' competency, for example, vocabulary mastery, writing skills, and speaking skills [4]. Integrating visual aids and auditory skills has been aimed at enriching vocabulary competency for English language learners. Including interactive exercises expands their lexical development. Similarly, students' oral language ability can be significantly developed by integrating audio-visual media, role play, and interactive dialogues, which draw on the semiotic resources of facial expressions, gestures, and proxemics. In addition, type of

educational media has evolved to boost the use of multiple modes through numerous tools, for example, YouTube, PowerPoint slides, a 3D environment and VR, virtual worlds, and digital games [7, p. 70–74].

However, the analysis of multimodality in English language learning is limited, especially in the context of higher education. Previous reviews have only focused on multimodal literacy analysis and a multimodal approach in primary and secondary schools [4, p. 2; 7, p. 70–76; 8, p. 165–170]. Ghaliya Al Farsi et al. in "A Review of Virtual Reality Applications in an Educational Domain" (2021) ground the claim that although studies have elaborated on multimodality, comprising the visual, gestural, spatial, and linguistic modes, it was only a concern in younger learners' development. In addition, prior review studies have failed to provide a thorough treatment of the most recent developments in technology, such as AR or VR, and the ways how it may be integrated into multimodal literacy with the potential of enhancing learners' communication skills. To address the broadened concept of literacy, educational researchers and teachers in higher education in many countries have introduced different multimodal pedagogies for multimodal literacy learning in the English language classroom [1, p. 104].

As highlighted by numerous scholars, student engagement is crucial for successful foreign language learning [2; 3; 4; 8]. Agentive engagement refers to students' deliberate efforts to enrich the learning process and conditions. Emotional engagement is associated with belonging to peers and school, enthusiasm, interest, and enjoyment. At the same time, negative emotions such as frustration, anxiety, and boredom are indicators of emotional disengagement. Cognitive engagement entails students' thoughtfulness, strategic thinking, cognitive processing, noticing, negotiation of meaning, and discussion of forms during language-related episodes. Behavioural engagement is students' effort, perseverance, and rule observation. Social engagement concerns learners' interactions with and support for their peers [2, p. 2–4].

Robots are a good platform for multimodal communication modes of meaning and have considerable potential for guiding students to engage in multimodal semiotic communication [5, p. 4]. In teaching practices, educational robotics is regarded as a learning tool for educational transformation [5; 6]. Integrating AR and VR into foreign language teaching platforms is a fine-tuned immersive means of teaching practices for multimodal literacies [6; 4].

The purpose of the study. The article aims to highlight the importance of using AR and VR in higher education institutions to increase the level of student's intrinsic motivation, participation, understanding, and confidence in foreign language learning. To achieve this purpose, the study addresses the following interconnected tasks: 1) to conduct a systematic review of research on multimodality, digital storytelling, and AR/VR in language education, identifying benefits and gaps, particularly in higher education contexts; 2) to analyze constructivist, sociocultural, and experiential learning theories as the foundation for understanding mechanisms of AR/VR storytelling in language acquisition; 3) to clarify key dimensions of student engagement (agentive, emotional, cognitive, behavioral, social) and how they may be fostered in immersive environments; 4) to survey and compare available AR/VR tools regarding functionality, accessibility, device requirements, and suitability for higher-education language tasks; 5) to identify potential technical barriers (device availability, interface complexity, students' digital skills) and opportunities for adaptation.

Presentation of the main material. The integration of digital technologies into foreign language instruction has significantly reshaped pedagogical paradigms, with Augmented Reality (AR) and Virtual Reality (VR) emerging as transformative tools. Among their innovative applications is digital storytelling, a multimodal approach that allows learners to create, experience, and interact with narratives in immersive environments [5]. The significance of digital multimodal communication is on the rise, both in everyday life and educational settings, where foreign language learners are actively engaging with a variety of digital multimodal texts, including video essays, infographics, and digital posters. In the twenty-first century the advent of advanced digital technologies has made multimodality an integral aspect of daily communication. This growing trend has captured the attention of foreign language educators and practitioners, as multimodality effectively tackles the complex nature of human communication through interactive interplay of various expressive modes [3; 4; 10].

Empirical research conducted by the New London Group has conclusively shown that digital multimodal composing (DMC), unlike traditional writing activities, manifests in diverse forms, such as graphic novels, academic posters, video essays, illustrated books, pamphlets, presentations, video documentaries, and web pages. This variety offers students an invaluable array of skills, which include heightened genre and audience awareness, enhanced semiotic awareness, improved critical thinking, facilitated identity construction, and the ability to construct their identities more authentically while expressing nuanced emotions [10, p. 1–2].

Digital storytelling in AR/VR integrates elements of constructivist learning theory, experiential learning, and sociocultural theory. Learners are no longer passive recipients of information but active participants, constructing knowledge through meaningful interaction. AR/VR environments simulate real-life scenarios that enable students to

practice vocabulary, grammar, and pronunciation in lifelike contexts [8, p. 166]. The narrative framework provides essential scaffolding, guiding learners to organize linguistic input into coherent, culturally situated outputs [5].

Within the framework of constructivist learning theory, foreign language acquisition is driven by experiential, dialogic, and contextually embedded interactions within simulated environments, social collaboration, and reflective practices. The key interactive principles are clearly defined: 1) active engagement with content and tools; 2) situated learning in authentic contexts; 3) social negotiation of meaning through interaction; 4) reflection and metacognition, which are critical for fostering deeper understanding [5; 7; 8; 10]. These principles strongly align with the capabilities of AR/VR technologies, enabling learners to immerse themselves in real-world scenarios and collaboratively construct narratives through digital means [8, p. 178–179].

In AR/VR environments, foreign language learners directly engage with content by interacting with virtual characters, navigating spaces, and manipulating digital objects. AR/VR supports situated learning by embedding language within authentic environments: rather than memorizing vocabulary in isolation, learners apply language to realistic scenarios, such as planning a trip, booking a hotel, doing shopping, sightseeing. Platforms like CoSpaces Edu and Mozilla Hubs provide learners with opportunities to create and explore multilingual worlds, such as virtual museums or cafés, where they can practice dialogues, present research, or conduct interviews. Many AR/VR platforms facilitate collaborative storytelling, allowing learners to co-create narratives, take on different roles, and interact with peers. For example, in Mozilla Hubs, students can conduct simulated interviews or engage in panel discussions using the target language.

Platforms like CoSpaces Edu and Storyfab empower learners to design their own stories, select appropriate vocabulary, and guide narrative flow, fostering motivation and personal investment. The process of digital storytelling often involves revision and feedback, prompting learners to analyze their linguistic choices and develop awareness of grammar, tone, and cultural nuance.

Google Expeditions, available via ExpeditionsPro, offers 360° immersive virtual tours of museums, cities, and natural landscapes allowing foreign language learners to conduct virtual field trips while practicing listening and reading through guided AR/VR narration and mastering storytelling with target vocabulary.

Mozilla Hubs, a free open-source VR/WebXR Platform, hosts engaging language conversation clubs set in virtual cafés or classrooms. For example, an English class can meet weekly in a virtual hub to debate principles of democracy or environmental issues, or practice presentation skills based on their research findings. This innovative use of VR spaces allows students to construct real-world contexts using mobile devices, such as checking into a hotel, ordering a meal in a restaurant, asking for directions in the city, visiting the doctor or explaining symptoms, participating in an international conference, delivering a speech, job interviews, etc.

Assemblr EDU can create interactive 3D AR scenes for immersive vocabulary lessons (home and household chores, shopping, eating out, human body, traveling) using 3D models and spoken descriptions adding voiceovers, text labels, and quizzes demonstrating projects in real-world settings using mobile devices.

Advanced foreign language learners can master Storyfab (Story Fabricator) AR-based storytelling, allowing virtual actors, props, and camera movement to turn real environments into digital film sets, acting out spoken dialogues and exporting short stories.

The core idea of The Language Immersion method is that language acquisition is maximized when learners "experience" the language through meaningful communication and content instruction, providing abundant comprehensible input in authentic or simulated contexts. Thus, a foreign language serves as the primary communication medium, exposing students to authentic language situations and materials. This approach naturally develops speaking and listening skills while fostering cultural awareness. Although some students may initially find complete immersion challenging, the long-term benefits of language acquisition and confidence building are substantial (Table 1).

Considering drawbacks, students might be unfamiliar with the software design options, limiting their access to advanced functionalities in creating AR/VR products. Teachers can also face similar technology-related issues in designing and implementing AR/VR based tasks [8, p. 179]. In a teacher collaborative action research project, Ju et al. (2024) found that teachers would experience the anxiety of being digital novices and seek help from students who served as technology assistants [10, p. 3]. Likewise, Wayan Eka Dian Rahmanu and Gyöngyvér Molnár (2024) found that some teachers might be resistant and hostile towards integrating technologies into students' storytelling [4, p. 4].

Conclusions. The research has demonstrated that AR/VR digital storytelling, grounded in constructivist, experiential, and sociocultural theories, holds significant promise for enhancing foreign language teaching in higher education. By immersing learners in authentic, context-rich scenarios, AR/VR storytelling fosters active engagement, situational language use, collaboration, learner autonomy, and reflective practice. Empirical and theoretical

Table 1

Foreign Language Learning Benefits of AR/VR Digital Storytelling

Didactic principle	AR/VR Digital Storytelling Feature	Language Learning Competence
Active learning	Immersive interaction with VR/AR environments	Real-life functional language use
Contextualized learning	Situational storytelling (cafés, airports, historical settings)	Vocabulary retention and pragmatic competence
Social interaction	Collaborative storytelling, group role-plays in VR	Speaking fluency, peer support
Learner ownership	Student-generated stories, world-building in AR	Motivation, creativity, personalized language use
Reflective thinking	Scriptwriting, narration, post-task discussion	Grammar awareness, discourse organization

studies indicate that such immersive multimodal experiences can improve vocabulary retention, oral fluency, pragmatic competence, and motivation. Platforms like CoSpaces Edu, Mozilla Hubs, Storyfab, and ExpeditionsPro illustrate practical means of embedding narrative tasks within virtual or augmented spaces, enabling students to co-create multilingual worlds, practice dialogues in life-like settings, and reflect on their linguistic choices. At the same time, challenges, such as technological unfamiliarity, access limitations, teacher anxiety, and resistance to innovation, underscore the need for careful scaffolding, professional development, and supportive institutional infrastructures. Overall, integrating AR/VR digital storytelling aligns with communicative and task-based pedagogies, offering a transformative approach that situates language learning within immersive, meaningful contexts. As higher education increasingly values digital literacies and multimodal competence, AR/VR digital storytelling emerges as a compelling method to cultivate not only linguistic proficiency but also critical thinking, intercultural awareness, and digital agency.

Prospects for further research. The potential of AR/VR to enhance communication skills through immersive and interactive experiences represents a critical area that remains underexplored in the context of higher education. By incorporating AR/VR and other emerging technologies into multimodal literacy practices, educators can create more engaging and effective learning experiences that cater to the diverse needs of learners. Perspectives for further research include longitudinal efficacy studies comparing AR/VR interventions with traditional multimodal methods; investigations into engagement dynamics and affective dimensions; design-based research to refine task templates; equity and usability analyses; assessment instrument development for multimodal literacies; cognitive load measurement in immersive contexts; intercultural competence outcomes; integration with emerging technologies such as AI-driven agents or educational robotics; and examination of policy and institutional factors influencing sustainable adoption.

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Шкарбан І. В. Цифровий сторітелінг засобами доповненої та віртуальної реальності у викладанні іноземних мов у вищій освіті

Швидке поширення технологій доповненої реальності (AR) та віртуальної реальності (VR) в освітніх середовищах створило нові можливості для імерсивного мультимодального викладання іноземних мов. Метою дослідження є окреслення ефективності застосунків AR/VR цифрового сторітелінгу для навчання іноземних мов у вищій освіті в аспекті переваг, обґрунтованих прагматичними педагогічними теоріями конструктивізму, експерименталізму та соціокультурними течіями. Проблемний контекст обумовлений необхідністю відійти від традиційних текстових чи екранних мультимодальних підходів на користь більш інтерактивних імерсивних середовищ задля формування інформаційно-комунікаційних компетентностей сучасних студентів та підвищення рівня їх вмотивованості у процесі вивчення іноземних мов. Емпіричні результати новітніх досліджень свідчать, що імерсивні методи цифрового сторітелігу у віртуальних чи доповнених середовищах сприяють глибшому закріпленню лексики, розвитку прагматичної компетентності, усної мовленнєвої вправності та критичного мислення, активізуючи емоційну й поведінкову залученість. Платформи, такі як CoSpaces Edu, Mozilla Hubs, Storyfab і ExpeditionsPro демонструють практичні приклади реалізації імерсивної методики, дозволяючи студентам спільно створювати віртуальні сценарії та простори (імітації подорожей, відвідування культурних осередків, професійні рольові ігри) у безпосередній особистісній чи груповій взаємодії із віртуальними агентами та цифровими артефактами іноземною мовою. У статті наголошено на викликах, пов'язаних з технічними обмеженнями, недоступністю цифрових ресурсів, тривогою викладачів-новачків у цифровій сфері та опором інноваціям, обґрунтовано необхідність структурованого формування сучасного цифрового освітнього простору, професійного розвитку цифрової компетентності та всебічної інституційної підтримки. Методологічне впровадження AR/VR цифрового сторітеллінгу вимагає відповідності конкретним мовним цілям та критеріям оцінювання сформованості мовних та мовленнєвих компетентностей, забезпечення оптимального рівня когнітивного навантаження та інклюзивної практики цифровізації інформаційного простору через мобільні та браузерні рішення. У дослідженні окреслено оптимальні траєкторії продуктивного залучення імерсивних методологічних інновацій AR/VR цифрового сторітелінгу задля оновлення педагогічних технологій викладання іноземних мов у вищій школі, підвищення лінгвістичної, комунікативної та соціокультурної компетентності студентів, їх цифрової самоефективності та соціокультурної свідомості.

Ключові слова: *доповнена реальність (AR), віртуальна реальність (VR), цифровий сторітелінг, імерсивні методи навчання, мультимодальна грамотність, методологічні інновації, сучасні педагогічні технології.*