

## Integrating Millealab Into English Language Teaching: A Conceptual Framework for Inclusive Education

Ranggia Dyas Pitaloka<sup>1\*</sup>, Erwin Hari Kurniawan<sup>2</sup>, Wildan Isna Asyhar<sup>3</sup>

Universitas Islam Kadiri, Kediri, Indonesia,123

[anggpitaloka55@gmail.com](mailto:anggpitaloka55@gmail.com)<sup>1</sup>, [erwin@uniska-kediri.ac.id](mailto:erwin@uniska-kediri.ac.id)<sup>2</sup>, [wildan@uniska-kediri.ac.id](mailto:wildan@uniska-kediri.ac.id)<sup>3</sup>

\* is Corresponding Author

### Abstract

Recent advances in immersive learning technologies have opened new pathways for innovation in English Language Teaching (ELT). Despite this progress, scholarly discussion on the application of Virtual Reality (VR) for inclusion students within Indonesia's Merdeka Curriculum remains limited. This study conceptually examines the integration of Millealab, an Indonesian-developed VR platform, into inclusive ELT as a means of supporting Sustainable Development Goal (SDG) 4, which emphasizes equitable and quality education for all. The proposed conceptual framework demonstrates how Millealab supports differentiated instruction, enhances learner engagement, and facilitates the design of Individualized Learning Programs (ILPs) aligned with inclusive education principles. By situating Millealab within interconnected pedagogical and technological dimensions, this study contributes to broader discussions on adaptive, accessible, and equitable VR-based instructional design. While challenges related to teacher preparedness and resource availability persist, the findings suggest that Millealab holds strong potential as a transformative model for inclusive ELT. Future empirical research is recommended to validate the framework and examine its long-term educational impact.

**Keywords:** *Millealab; Virtual Reality; English Language Teaching (ELT); Inclusive Education; Differentiated Instruction.*

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### INTRODUCTION

Teaching English as either a first or a second language requires more than the transmission of linguistic knowledge; it involves enabling learners to use language effectively in varied communicative contexts (Syahria et al., 2024; Sawalmeh & Dey, 2023). Effective English instruction, therefore, encompasses the integration of grammar, vocabulary, pronunciation, and the four core language skills: listening, speaking, reading, and writing, within meaningful learning experiences (Burns, 2019; Isnavira & Sujannah, 2023). In addition, successful English language teaching emphasizes cultural sensitivity and contextual awareness so that learners can apply language appropriately in real-life situations (Corbett, 2022; Islam, 2024). To address diverse learner profiles, teachers increasingly blend conventional instructional methods with interactive and technology-supported approaches, aiming to enhance engagement and learning effectiveness (Qassim et al., 2024).

The advancement of digital technology has significantly reshaped practices in English Language Teaching (ELT), offering new possibilities for learner participation and inclusion. Emerging technologies, such as Virtual Reality (VR), provide immersive and interactive learning environments that allow instruction to be tailored to individual learner needs, including those of students with special educational needs. Despite this potential, studies examining the application of VR in inclusive ELT contexts in Indonesia remain limited. In particular, there is insufficient understanding of how locally developed VR platforms can be strategically employed to support inclusive English instruction

and improve learning outcomes.

This issue is closely aligned with Sustainable Development Goal (SDG) 4, which emphasizes the importance of inclusive and equitable quality education as well as lifelong learning opportunities for all (Morton et al., 2017). Inclusive education is fundamental to achieving this goal, as it promotes equitable access to learning by recognizing and responding to learner diversity. As noted by Elfert (2019), inclusive practices not only support individual growth but also contribute to broader social and economic development by reducing educational inequality. In Indonesia, inclusive principles are reflected in the current curriculum, which encourages intracurricular inclusivity through flexible learning pathways designed to strengthen student competencies (Simarmata & Mayuni, 2023). Similarly, Simamora & Pasaribu (2023) highlight that inclusive values are inherently embedded in the curriculum's pedagogical framework.

At the instructional level, the Individualized Education Program (IEP) functions as an essential mechanism for addressing diverse learner needs through systematic planning, implementation, and evaluation (Arriani et al., 2022). The planning phase involves assessment and collaboration among teachers, counselors, specialists, parents, and therapists to identify student readiness and learning profiles. During implementation, instructional strategies are continuously adjusted through monitoring and communication, while evaluation focuses on reviewing program effectiveness and learner progress to inform future instructional decisions.

Collaboration among educational stakeholders plays a crucial role in ensuring responsive and inclusive instruction. However, the practical implementation of inclusive education continues to face challenges. Limited institutional resources and organizational constraints often hinder inclusive practices in English classrooms (Aubakirova & Bakbergen, 2022). Furthermore, many teachers experience difficulties in identifying and accommodating diverse learner needs, particularly in heterogeneous classrooms (Puspitasari, 2019). Addressing these challenges requires teachers to possess strong professional competence, pedagogical flexibility, and linguistic proficiency, supported by curricula that are intentionally designed to promote inclusion (Antyufeeva & Bulaeva, 2019).

Differentiated instruction further strengthens inclusive practices by adapting learning experiences to students' readiness levels, interests, and learning profiles (Tomlinson, 2017). In inclusive English classrooms, differentiation supports active learner participation and fosters creativity while maintaining clear instructional objectives (Tomlinson & Imbeau, 2023; Qorib, 2024). Nevertheless, significant obstacles remain, particularly related to insufficient teacher training in inclusive pedagogy and limited access to instructional resources (Ozel et al., 2018; Mitchell & Sutherland, 2020). These issues are often more pronounced in under-resourced educational settings (Martin & Jackson, 2002).

In response to these challenges, the integration of educational technology has gained increasing attention as a means of supporting inclusive ELT. Technology has been shown to facilitate learner engagement and provide adaptive learning tools that benefit students with diverse needs (Prayudha et al., 2023; Villalobos et al., 2019). Research also indicates that digital media and ICT-based tools can enhance language learning outcomes while simultaneously strengthening teachers' instructional capacity (Kessler, 2018; Shinde & Shaikh, 2020). Within this technological landscape, VR has demonstrated potential in creating immersive learning environments that improve learner motivation and language performance (Chung, 2012; Pan et al., 2021).

Previous studies have reported positive outcomes of VR-based English instruction for inclusion students, including improvements in vocabulary development, dialogue practice, and overall language proficiency (Liu, 2021). VR has also been identified as beneficial for learners with visual impairments and intellectual disabilities due to its interactive and flexible learning design (Cárdenas & Inga, 2021; Vasconcelos et al., 2016; Jing, 2022). However, successful implementation depends on teacher readiness, technological competence, and careful consideration of learner characteristics and

classroom conditions (Kurniawati et al., 2022).

Within the Indonesian educational context, Millealab—a locally developed VR-based learning platform offers a culturally relevant solution for integrating immersive technology into English instruction (Febriana et al., 2023; Zulherman et al., 2021). Despite its growing use, empirical research examining Millealab's role in inclusive ELT remains scarce. Therefore, this study aims to develop a conceptual framework for integrating Millealab into English Language Teaching within inclusive education settings. By utilizing Millealab's interactive and customizable features, the study seeks to support differentiated instruction, enhance learner engagement, and promote educational equity. The findings are expected to contribute both theoretically, by expanding insights into VR-supported inclusion in ELT, and practically, by guiding educators in implementing inclusive, accessible, and equitable English learning environments in line with SDG 4.

## **METHOD**

In scholarly research, a conceptual framework serves as an organizing mechanism that links theoretical perspectives, methodological choices, and the overall focus of a study. Previous studies underline that a well-articulated framework strengthens analytical rigor and ensures consistency between theory and methodological implementation (Kulesa et al., 2024; Muchanga & Chalawila, 2022). This study employed a framework development research design to formulate a conceptual model for integrating Millealab, an Indonesian-developed Virtual Reality (VR) platform, into English Language Teaching (ELT) within inclusive educational settings. This design was selected because it allows for the systematic synthesis of theoretical insights and contextual evidence into a coherent framework that bridges conceptual reasoning and pedagogical practice. Moreover, the approach supports the development of a model that can inform instructional implementation as well as future empirical research in inclusive, technology-enhanced ELT.

To examine the potential application of Millealab in inclusive English instruction, the study utilized both primary and secondary data sources. Primary data were obtained from official educational policies and curriculum-related documents, including the Kurikulum Merdeka, national regulations on inclusive education, and guidelines for Individualized Learning Programs (ILP) for students with special educational needs. Secondary data consisted of an extensive review of scholarly literature covering inclusive pedagogy, VR-supported learning, and technology-integrated language teaching frameworks. These sources enabled the identification of conceptual relationships among inclusion, digital technology, and English language education in the Indonesian context.

The analytical process was conducted through three sequential stages. Theoretical mapping was carried out by reviewing international and national literature to identify key theoretical constructs linking inclusive education, VR-enhanced learning environments, and ELT. This stage established the conceptual positioning of Millealab within these intersecting domains. Document analysis was undertaken to examine educational policies and curricular frameworks to assess the alignment of Millealab with inclusive education principles, ILP implementation strategies, and adaptive instructional design. This analysis clarified the consistency between theoretical expectations and institutional practices. Framework construction involved synthesizing insights derived from both literature review and document analysis to develop a conceptual framework that integrates VR affordances, inclusive pedagogical principles, and English language learning objectives.

Across these stages, the analysis was guided by three core dimensions: (1) the alignment of Millealab with inclusive education principles; (2) the integration of individualized and differentiated learning strategies; and (3) the adaptation of English Language Teaching methodologies to accommodate diverse learner needs. This structured methodological approach was informed by the identification of a significant research gap. Although the use of VR in Indonesian education has increased, existing studies on Millealab have predominantly focused on disciplines such as science and

social studies, with limited exploration of its application in inclusive English Language Teaching. In response to this gap, the present study develops a conceptual framework that integrates VR theory with inclusive education paradigms, offering both theoretical contributions and practical guidance for future implementation and empirical validation of Millealab in inclusive ELT contexts.

## **RESULT**

The synthesis of scholarly literature and educational policy documents reveals three interconnected dimensions that underpin the integration of Millealab, a Virtual Reality (VR) platform, into inclusive English Language Teaching (ELT). These dimensions emerge from the intersection of inclusive education principles, teacher readiness, and technology-enhanced pedagogy. The findings indicate that the effective adoption of Millealab relies on the alignment of teacher competence, inclusive instructional design, and student-centered engagement and assessment. Together, these dimensions constitute the core structure of the conceptual framework developed in this study.

### **Development of Dimensions: The Structure of The Conceptual Framework**

#### ***Dimensions of Teacher Preparedness and Technological Readiness***

Teacher preparedness is a decisive factor in the successful implementation of VR-based instruction within inclusive learning environments. Existing studies indicate that educators often encounter obstacles related to limited financial resources, inadequate infrastructure, and insufficient professional training. (Zwane & Malale, 2018). In addition, attitudinal challenges, including low expectations and professional isolation, may further hinder inclusive practices. (Juvonen et al., 2019). These conditions highlight the need for inclusive education policies that prioritize sustained professional support and capacity-building, particularly in relation to emerging technologies.

Teacher readiness for VR-based instruction encompasses both technological competence and pedagogical capability. Prior studies indicate that educators must first develop operational skills related to VR hardware and software, including basic troubleshooting, to build confidence in classroom implementation. (Huang et al., 2021; Sherman & Craig, 2018). Practical training opportunities are essential to support this process. Furthermore, teachers are expected to critically evaluate the suitability of VR content in relation to learners' abilities and instructional objectives. (Johnston et al. (2018); Karacan & Akoglu (2021).

Pedagogical readiness is equally essential. Teachers are encouraged to design lesson plans that integrate VR activities in ways that enhance learning outcomes while accommodating learner diversity. (Mitchell & Sutherland, 2020). Research suggests that VR can support students with learning difficulties by transforming abstract language concepts into concrete and interactive experiences. (Kormos & Smith, 2023). To ensure accessibility, adaptive features such as subtitles and adjustable difficulty levels should be incorporated. (Blume & Würffel, 2018). Collaborative planning with special education professionals and the inclusion of student feedback further strengthen implementation, enabling teachers to establish inclusive and dynamic VR-supported learning environments (Lalotra & Kumar, 2024; Karagianni & Drigas, 2023).

#### ***Dimensions of Pedagogical Design and VR Integration***

The integration of VR into inclusive ELT is highly dependent on intentional pedagogical design. Prior studies indicate that VR-supported English instruction is most effective when it offers immersive and meaningful learning experiences that respond to diverse learner needs. (Southgate et al., 2019; Xie et al., 2022; Yang et al., 2020). This process begins with the careful selection of VR content aligned with curriculum goals and targeted language outcomes. (Cammarata & Haley, 2018). Examples include virtual storytelling, simulated communicative scenarios, and virtual field experiences that support vocabulary development, comprehension, and oral communication.

Gradual introduction of VR activities is recommended to foster learner confidence and reduce cognitive load. Teachers should begin with simple tasks before progressing to more complex interactions, ensuring that each session is guided by clear learning objectives (Cammarata & Haley, 2018). Inclusive design principles play a critical role in this process by promoting flexibility, accessibility, and responsiveness to varied learning styles (Blume & Würffel, 2018).

Integrating VR within Individualized Learning Programs (ILPs) further aligns instruction with learners' individual strengths and learning pace. This approach reflects the inclusive values embedded in Indonesian educational policy and supports SDG 4's commitment to equitable education (Elfert, 2019; Simamora & Pasaribu, 2023). As a locally developed platform, Millealab functions as a pedagogical bridge that connects inclusive principles with immersive digital learning opportunities.

### ***Dimensions of Student Engagement and Assessment***

VR-based platforms such as Millealab enhance student engagement by offering multisensory and interactive learning experiences that encourage active participation among students. (Southgate et al., 2019; Xie et al., 2022). Teachers play a key role in facilitating engagement, monitoring participation, and ensuring that learning activities remain inclusive throughout the instructional process. (Harris et al., 2022). Adaptive strategies, including peer collaboration, task modification, and alternative non-VR activities, may be employed to accommodate learners with differing needs. (Ziegler et al., 2020).

Ongoing assessment and feedback are essential for monitoring student progress and informing instructional adjustments. Reflective activities that encourage learners to share their VR experiences can foster a classroom culture that values diverse perspectives and learning preferences. (Sanger, 2020). When thoughtfully implemented, VR-based English instruction supports inclusive learning environments that motivate and empower students. (Anis, 2023).

Assessment practices in VR-enhanced ELT should capture both learning processes and outcomes. A combination of traditional and innovative assessment methods is recommended to provide a comprehensive understanding of student performance. (AlGerafi et al., 2023). During VR sessions, formative assessments such as observation checklists, learner reflections, and guided discussions allow teachers to respond to student needs in real time. (Christopoulos et al., 2018). Summative approaches may include project-based tasks. (Makransky et al., 2019) and digital portfolios containing visual records and reflective artifacts from Millealab activities (Clarke & Boud, 2018). Peer and self-assessment further encourage learner autonomy and collaborative reflection. (Yancey et al., 2023).

Overall, the analysis identifies three interdependent dimensions: (1) Teacher preparedness and technological readiness, (2) Pedagogical design and VR integration, and (3) Student engagement and assessment—as the foundational components of the conceptual framework for integrating Millealab into inclusive ELT. The findings emphasize that successful implementation depends on the synergy between educator competence, inclusive instructional strategies, and learner-centered evaluation. By aligning immersive technology with inclusive education principles, Millealab offers a pathway toward more accessible, equitable, and engaging English language learning experiences.

### **Teacher Preparation In Creating Media Using Millealab**

#### ***Overview of Millealab's Role in Teacher Preparation***

MilleaLab is an integrated virtual reality (VR) platform designed for K–12 education, leveraging 3D technologies and cloud computing. This platform enables educators to create and share virtual learning environments easily, quickly, and cost-effectively. However, there remains a significant research gap concerning the use of MilleaLab as an inclusive instructional medium, particularly in English language teaching (ELT). Future studies are encouraged to address this gap by exploring how

MilleaLab can enhance inclusive and adaptive learning practices in diverse educational settings. (Kholifah & Buchori, 2023).

MilleaLab represents a significant advancement in educational technology, offering immersive and interactive learning experiences through the integration of Virtual Reality (VR) and Augmented Reality (AR). These capabilities are particularly beneficial for inclusive education, allowing the creation of adaptable and accessible learning scenarios for all students. By providing a customizable library of educational modules and a user-friendly interface, MilleaLab helps educators integrate technology into their teaching practices effectively (Yanto et al., 2023).

### ***Technical Readiness and Familiarization***

Teacher preparation in creating media using MilleaLab begins with building technical readiness and familiarity with the platform's tools and functionalities. MilleaLab Creator is easy to use for beginners, developed by Indonesian IT experts, and equipped with thousands of 3D assets that can be applied simply by drag and drop. Teachers only need a computer or laptop to use MilleaLab Creator, while students can access the content through MilleaLab Viewer on mobile devices for free. (Kholifah & Buchori, 2023; Yanto et al., 2023).

Before implementation, teachers should be trained in navigation, tool utilization, and troubleshooting common issues. (Yanto et al., 2023). Hardware and infrastructure readiness also play a crucial role, including the availability of compatible devices and VR glasses. Although MilleaLab software is affordable, educators must consider financial aspects and school support to ensure sustainable and comfortable classroom implementation. (Bower et al. (2020); Glas et al. (2023)).

### ***Pedagogical Competence and Content Creation***

After mastering the technical aspects, teachers need to strengthen their pedagogical competence in designing interactive and meaningful learning content. MilleaLab provides various features such as multimedia integration, interactive quizzes, and virtual simulations that can make lessons more dynamic and engaging. (Alkahfi et al., 2024). Training should focus on how to integrate these tools effectively into lesson plans so that learning activities not only capture students' attention but also deepen their conceptual understanding. (Yanto et al., 2023).

In the context of English language teaching, teachers can use MilleaLab to create personalized and experiential learning environments. Examples include customized vocabulary lists, grammar exercises, and reading comprehension simulations that provide immersive practice opportunities. Such pedagogical use ensures that technology supports, not replaces, meaningful learning.

### ***Inclusive Design Principles and Accessibility***

Integrating inclusive design strategies is a crucial part of teacher preparation in using MilleaLab. Teachers must be equipped with approaches that support diverse learners, including students with disabilities (Harpiawan, 2023; Langitasari et al., 2022). Applying adaptive learning concepts and Universal Design for Learning (UDL), educators can create content that accommodates different learning styles, supports assistive technologies, and provides equal access for all students.

Through VR and 3D simulations, teachers can design differentiated learning paths where students can explore content according to their abilities and preferences. These inclusive practices help ensure that every learner feels valued and supported within a technology-enhanced classroom environment.

### ***Institutional Support and Reflection***

Effective implementation of MilleaLab requires institutional support, continuous professional development, and reflective teaching practices. Schools should facilitate training sessions, peer

collaboration, and the sharing of best practices to help teachers integrate VR-based media sustainably. Financial and technical support from the institution ensures that learning innovations can be maintained and scaled.

Finally, teachers are encouraged to reflect on their use of Millealab to evaluate its impact on student engagement, inclusion, and learning outcomes. By combining technical proficiency, pedagogical innovation, and inclusive awareness, educators can utilize Millealab not only as a digital tool but as a transformative medium to foster adaptive and equitable English language learning experiences.

## **Integrating Millealab Into English Language Teaching**

### ***Introduction to Integration Principles***

Preparing teachers to develop learning media using Millealab in inclusive English Language Teaching (ELT) requires systematic planning grounded in sound pedagogical principles. As a VR/AR-based immersive platform, Millealab offers rich multisensory experiences that can enhance accessibility and engagement for inclusion students. Within inclusive ELT contexts, Millealab functions as a mediating tool that connects technological innovation with instructional practice, enabling learners with diverse abilities to participate meaningfully in language learning activities. The primary objective of this preparation is to support teachers in creating flexible, equitable, and motivating learning environments. Consequently, teachers must design learning media that address linguistic goals while simultaneously fostering students' social interaction, emotional comfort, and confidence in using English.

### ***Accessibility and Inclusivity Design***

Ensuring accessibility is a fundamental aspect of teacher preparation when creating Millealab-based learning media. Teachers need to consider how the platform can be navigated easily by all learners, including those with physical, sensory, or cognitive limitations. Media design should prioritize simplicity and clarity, allowing students to interact independently with minimal technical difficulty. Features such as adjustable controls, alternative input methods, or customizable sensory settings can help reduce barriers and prevent discomfort during VR use.

In this process, the application of Universal Design for Learning (UDL) principles is essential. Teachers should design media that provide multiple means of representation, engagement, and expression to accommodate individual differences. Differentiated instructional strategies enable learners to engage with content through visual, auditory, or kinesthetic modes. The integration of assistive technologies such as captions, text-to-speech tools, or screen-reading functions further enhances inclusivity and ensures that Millealab media responds effectively to varied learner needs.

### ***Pedagogical Integration in ELT Practice***

Effective media creation using Millealab begins with deliberate instructional design and careful classroom planning. Teachers should prepare clear explanations and demonstrations on how Millealab is used, ensuring students understand how to access and navigate the virtual environment through VR headsets or alternative devices such as laptops or smartphones. Structured, step-by-step guidance supports students' confidence and comprehension, while scaffolding strategies help maintain focus on language learning objectives throughout the activity.

To maximize learning relevance, teachers can design VR-based tasks that reflect authentic language use, including simulated conversations, virtual storytelling, or contextualized exploration activities. Such experiences support vocabulary development, listening comprehension, and speaking fluency in meaningful contexts. Interactive components such as games, collaborative challenges, or embedded quizzes can further enhance engagement and motivation. Additionally, breaking down

complex tasks into smaller segments helps minimize cognitive load and ensures that all students can participate effectively.

### ***Collaboration and Classroom Management***

Teacher preparation for Millealab media creation also involves collaborative planning and effective classroom management. English teachers are encouraged to coordinate with shadow teachers, special education professionals, or teaching assistants to ensure that inclusion students receive appropriate guidance during VR-based activities. Joint preparation allows educators to anticipate potential learning challenges and technical issues before implementation.

During classroom use, teachers must remain attentive to students' physical comfort and emotional responses, as VR environments may cause fatigue or motion-related discomfort for some learners. In such situations, alternative learning activities should be readily available. Collaboration with technical support staff is equally important to maintain smooth operation and minimize disruptions. Continuous communication among teachers, support staff, and students contributes to a safe, supportive, and inclusive learning atmosphere.

### ***Assessment and Reflection***

Assessment strategies for Millealab-based ELT media should be adaptive and inclusive. Teachers can employ a combination of formative and summative assessment methods, such as in-platform quizzes, observational checklists, oral performances, or reflective journals. Assessment choices should align with students' abilities, learning preferences, and instructional goals. Effective time management during VR sessions is also necessary to sustain engagement and avoid cognitive or physical fatigue.

Reflection plays a critical role in refining instructional media. Teachers should actively seek student feedback regarding their experiences with Millealab to identify strengths and areas for improvement. Ongoing monitoring of learner progress allows teachers to adjust instructional strategies and provide targeted support. By incorporating reflective practices, self-assessment, and peer feedback, Millealab-based media can promote deeper learner awareness and continuous instructional improvement.

Teacher preparation in creating learning media using Millealab is a multidimensional process that emphasizes accessibility, pedagogical alignment, and collaborative practice. Through careful planning, inclusive design, and reflective assessment, teachers can leverage Millealab to create immersive and equitable English learning experiences. This framework supports not only language development but also the cultivation of inclusivity, empathy, and digital competence, which are essential skills for learners in 21st-century educational contexts.

### ***Research Gaps and Future Directions***

Despite the strong conceptual potential of Millealab in supporting inclusive English Language Teaching (ELT) through immersive technologies, several important aspects have not yet been sufficiently investigated. The proposed framework provides an initial foundation; however, further empirical and contextual exploration is required to fully understand the role of virtual and augmented reality in inclusive pedagogy. Identifying and addressing the following research gaps is essential to reinforce both the theoretical robustness and the practical application of Millealab, particularly in developing educational contexts where access to inclusive digital learning remains uneven.

### ***Empirical validation and longitudinal research***

Although preliminary findings suggest that Millealab contributes positively to inclusive learning environments, robust empirical evidence, particularly from longitudinal studies, remains limited.

Future research should focus on examining the long-term impact of VR and AR integration on students' academic achievement, engagement, and cognitive growth over extended instructional periods. Longitudinal data are necessary to evaluate the durability and consistency of MilleaLab-based instructional practices across different educational settings.

#### ***Differentiated impact among learner subgroups***

Inclusive classrooms encompass learners with diverse learning profiles and socio-cultural backgrounds, yet research exploring MilleaLab's differentiated effects across learner subgroups is still scarce. Future studies should investigate how immersive learning influences students with specific learning disabilities, language disorders, or varied cultural and socioeconomic conditions. Such analyses will contribute to refining MilleaLab's instructional design and ensuring equitable access and effectiveness for all learners, particularly those from marginalized or under-resourced communities.

#### ***Teacher professional development and institutional readiness***

The effective implementation of MilleaLab is closely linked to teachers' digital competence and the level of institutional support available. However, limited attention has been given to examining professional development models that prepare educators to integrate immersive technologies into inclusive ELT. Further research is needed to explore teacher training frameworks, as well as institutional readiness factors such as technological infrastructure, policy support, and resource management, to enable sustainable and scalable adoption.

#### ***Ethical and sustainability considerations***

As VR and AR technologies become increasingly integrated into educational practice, ethical and sustainability concerns warrant greater scholarly attention. Future investigations should address issues related to data privacy, student digital well-being, equitable access, and responsible technology use. In addition, examining the potential psychological and physical effects of prolonged exposure to immersive environments, alongside strategies for sustainable implementation, will help ensure that MilleaLab is applied in a safe and ethically responsible manner.

#### ***Scalability and cross-context adaptation***

Another critical research gap lies in understanding how MilleaLab can be expanded and adapted across diverse educational contexts. Future studies should explore its feasibility and effectiveness in schools with limited technological resources, as well as in varied cultural and linguistic settings. Investigating cross-context adaptation will provide insights into MilleaLab's scalability and inform broader strategies for implementing inclusive immersive learning solutions at regional and global levels.

Addressing these identified gaps will contribute to the development of a more comprehensive, ethically sound, and context-sensitive framework for immersive learning in inclusive ELT. Future research should aim to establish evidence-based, scalable, and culturally responsive models that support both teachers and learners in technology-enhanced classrooms. Ultimately, this vision aligns with a broader educational transformation that emphasizes inclusivity, equity, and sustainable innovation in the digital era.

## **DISCUSSION**

### **Restating the Purpose and Key Insights of the Conceptual Framework**

This study aimed to construct a conceptual framework for integrating MilleaLab, a virtual reality (VR) platform, into inclusive English Language Teaching (ELT). The framework was designed to address the challenges faced by teachers and students in inclusive classrooms, particularly in contexts with limited resources and diverse learner abilities. Through the analysis of literature and inclusive

education documents, several key dimensions emerged: teacher preparedness, pedagogical design, accessibility, collaboration, and inclusive assessment. Collectively, these elements demonstrate how MilleaLab can bridge technological innovation and inclusive pedagogy by promoting equitable, engaging, and differentiated English learning experiences. Furthermore, the framework establishes a foundational model for future empirical studies to examine how immersive technologies can operationalize inclusive principles within the classroom.

### **Implications for Inclusive ELT: Pedagogical and Technological Perspectives**

The integration of MilleaLab demonstrates the pedagogical potential of VR to create meaningful and personalized learning opportunities for inclusion students. Teachers often encounter barriers such as limited financial support and a lack of accessible teaching materials, which hinder their ability to meet diverse learning needs. These challenges align with the findings of Zwane & Malale (2018), who emphasize that inadequate resources can reduce instructional effectiveness. Additionally, attitudinal barriers, including low teacher expectations and social isolation, as noted by Juvonen et al. (2019), negatively affect the participation of students with special needs. MilleaLab addresses these challenges by providing immersive, interactive environments that encourage empathy, motivation, and social engagement, aligning with the constructivist approach that learning occurs through active, experiential participation.

From a technological perspective, the success of MilleaLab integration relies heavily on teacher competence and confidence in using digital tools. This finding resonates with Sherman & Craig (2018), who assert that teachers must master both hardware and software aspects of VR for effective implementation. Moreover, the principles of Differentiated Instruction Tomlinson (2017), emphasize that instruction must be adaptive to individual learner differences. Through MilleaLab, teachers can design customized tasks and scaffolded activities that respond to learners' strengths and challenges. Thus, the framework underscores that the effective use of VR in inclusive ELT is not merely about technological access but about embedding inclusive pedagogical principles within digital learning environments.

### **Alignment with Existing Theories and Prior Research**

The conceptual framework developed in this study is grounded in and extends several established theories of inclusive pedagogy and educational technology. The principles of Universal Design for Learning (UDL) and Differentiated Instruction Tomlinson (2017) support the notion that every learner requires multiple means of engagement, representation, and expression—dimensions that MilleaLab facilitates through immersive and interactive features. Furthermore, the framework aligns with Indonesia's Individualized Learning Program (ILP) model (Arriani et al. (2022) which emphasizes a continuous cycle of planning, implementation, and evaluation, ensuring that each student's learning path is both personalized and measurable.

In parallel, the constructivist perspective is reflected in how MilleaLab encourages learners to build understanding through active exploration and social collaboration within virtual environments. The framework also reinforces prior research by Sherman & Craig (2018), on VR-based learning, which identifies teacher readiness as a critical determinant of successful technology integration, while complementing global studies that highlight immersive VR as a means to enhance student engagement and equitable participation in language learning.

### **Contextual and Practical Significance: Indonesia and Beyond**

In the Indonesian context, the framework holds particular relevance for the Merdeka Curriculum, which emphasizes autonomy, differentiation, and inclusivity. The integration of MilleaLab aligns with national educational reform priorities, especially the focus on Individualized Learning

Programs for diverse learners. It provides a feasible technological solution for both mainstream and inclusive schools, including those in under-resourced areas. By promoting collaboration among general teachers, shadow teachers, and special education staff, MilleaLab fosters a cohesive support system that enhances communication, coordination, and consistency in inclusive practices.

Beyond Indonesia, the framework contributes to the global discourse on digital inclusion and immersive pedagogy. It offers a scalable model for adapting VR-based tools in developing countries, where infrastructural and professional challenges often limit innovation. By demonstrating that equity in digital learning can coexist with advanced technology, this study underscores the importance of contextual responsiveness and cultural adaptation in global education systems.

Overall, the integration of MilleaLab into inclusive ELT represents a transformative step toward reimagining digital learning for all. The conceptual framework bridges theoretical foundations and classroom realities, providing educators with a structured pathway to design inclusive, technology-enhanced learning experiences. It highlights the interconnectedness of teacher preparedness, inclusive pedagogy, and technological adaptability as core drivers of digital inclusion.

Future research should build upon this framework through empirical validation, examining long-term impacts on learning outcomes, teacher practices, and school readiness across varied contexts. In addition, future studies should integrate ethical considerations such as data privacy, digital well-being, and equitable access, ensuring the responsible adoption of immersive technologies.

By advancing equitable and high-quality digital learning opportunities, this framework contributes directly to Sustainable Development Goal (SDG) 4: Quality Education, which calls for inclusive and lifelong learning for all. The MilleaLab-based framework envisions an educational ecosystem where technology empowers diversity, innovation supports equity, and every learner, regardless of ability or context, can thrive in a connected, inclusive, and future-ready world.

## **CONCLUSION**

The incorporation of Millealab into English Language Teaching (ELT) represents a significant advancement in fostering inclusive learning through immersive digital technologies. This study illustrates how the integration of Virtual Reality (VR) and Augmented Reality (AR) within Millealab effectively connects pedagogical practices, technological innovation, and inclusive education goals in contemporary learning environments. The proposed conceptual framework offers a systematic basis for harmonizing inclusive pedagogy, accessibility considerations, and digital transformation in ELT. From a theoretical standpoint, the framework contributes to the discourse on inclusive ELT by positioning technology-enhanced instruction within the principles of Universal Design for Learning (UDL) and socio-cultural learning theory. This alignment expands both conceptual and practical understandings of differentiated instruction, student engagement, and cultural sensitivity, particularly in classrooms characterized by learner diversity.

Pedagogically, Millealab supports flexible instructional design, active learner involvement, and collaborative learning experiences among students with varying abilities. The platform empowers teachers to design adaptive learning activities that respond to individual differences, thereby promoting equitable participation and sustained engagement in English language learning. At the institutional level, the framework underscores the critical role of teacher capacity building, organizational preparedness, and policy alignment in ensuring the responsible and sustainable adoption of VR and AR technologies. Key recommendations include the implementation of continuous professional development programs, the provision of inclusive digital infrastructure, and the formulation of clear guidelines to support equitable access to immersive learning tools in schools.

Looking forward, further research is needed to validate this framework through longitudinal studies, investigate its differential effects across diverse learner groups, and assess its scalability in various educational contexts. Additional inquiries into cost efficiency, accessibility challenges, and

teacher competency development will further strengthen the sustainability of immersive technology integration in education.

In conclusion, Millealab reflects a forward-looking approach to harmonizing inclusivity and digital innovation in education. Through the ethical and equitable use of immersive technologies, educators can cultivate learning environments that ensure meaningful, engaging, and empowering educational experiences for all students, regardless of their backgrounds or abilities.

## REFERENCES

- AlGerafi, M. A. M., Zhou, Y., Oubibi, M., & Wijaya, T. T. (2023). Unlocking the potential: A comprehensive evaluation of augmented reality and virtual reality in education. *Electronics*, 12(18), 3953. <https://doi.org/https://doi.org/10.3390/electronics12183953>
- Alkahfi, M. I., Mastur, M., & Utama, A. H. (2024). Utilization Of The Millealab Application As A Virtual Reality Media To Support Self-Directed Learning. *Eduvest - Journal of Universal Studies*, 4(4), 2090–2103. <https://doi.org/10.59188/eduvest.v4i4.1152>
- Antyufeeva, Yu. N., & Bulaeva, N. E. (2019). Specific features of introducing the components of inclusive education in higher education institutions when training professional communication in English. *Professional Discourse & Communication*, 1(2), 88–99. <https://doi.org/10.24833/2687-0126-2019-1-2-88-99>
- Aubakirova, K. K., & Bakbergen, A. K. (2022). PROBLEMS OF TEACHING ENGLISH IN INCLUSIVE EDUCATION. *Bulletin of the Korkyt Ata Kyzylorda University*, 99–106. <https://doi.org/10.52081/bkaku.2022.v61.i2.066>
- Blume, C., & Würffel, N. (2018). Using Technologies for Foreign Language Learning in Inclusive Settings. *Fremdsprachen Lehren Und Lernen*, 47(2). <https://elibrary.narr.digital/xibrary/media.xav/download.pdf?medianame=flul472/flul4720008.pdf&csrf=BCD47B9635244BDF3D6F8E6794E3C1C9F60931B>
- Bower, M., DeWitt, D., & Lai, J. W. M. (2020). Reasons associated with preservice teachers' intention to use immersive virtual reality in education. *British Journal of Educational Technology*, 51(6), 2215–2233. <https://doi.org/https://doi.org/10.1111/bjet.13009>
- Burns, A. (2019). Concepts for teaching speaking in the English language classroom. *LEARN Journal: Language Education and Acquisition Research Network*, 12(1), 1–11. <https://so04.tci-thaijo.org/index.php/LEARN/article/view/168564/121290>
- Cammarata, L., & Haley, C. (2018). Integrated content, language, and literacy instruction in a Canadian French immersion context: a professional development journey. *International Journal of Bilingual Education and Bilingualism*, 21(3), 332–348. <https://doi.org/10.1080/13670050.2017.1386617>
- Cárdenas, J., & Inga, E. (2021). Methodological Experience in the Teaching-Learning of the English Language for Students with Visual Impairment. *Education Sciences*, 11(9), 515. <https://doi.org/10.3390/educsci11090515>
- Christopoulos, A., Conrad, M., & Shukla, M. (2018). Increasing student engagement through virtual interactions: How? *Virtual Reality*, 22(4), 353–369. <https://doi.org/10.1007/s10055-017-0330-3>
- Chung, L. Y. (2012). Incorporating 3D-Virtual Reality into Language Learning. *International Journal of Digital Content Technology and Its Applications*, 6(6), 249–255. <https://doi.org/10.4156/jdcta.vol6.issue6.29>
- Clarke, J. L., & Boud, D. (2018). Refocusing portfolio assessment: Curating for feedback and portrayal. *Innovations in Education and Teaching International*, 55(4), 479–486. <https://doi.org/10.1080/14703297.2016.1250664>
- Corbett, J. (2022). *An Intercultural Approach to English Language Teaching* (Vol. 36). Multilingual Matters. <https://doi.org/10.21832/9781788928625>

- Elfert, M. (2019). Lifelong learning in Sustainable Development Goal 4: What does it mean for UNESCO's rights-based approach to adult learning and education? *International Review of Education*, 65(4), 537–556.
- Febriana, D., V.Y., I. A., & Pamungkas, A. S. (2023). Pengembangan Media Pembelajaran Virtual Reality berbantu Millea Lab pada Mata Pelajaran Matematika di Sekolah Dasar. *JURNAL PENDIDIKAN DASAR*, 11(2), 329–340. <https://doi.org/10.46368/jpd.v11i2.926>
- Glas, K., Catalán, E., Donner, M., & Donoso, C. (2023). Designing and providing inclusive ELT materials in times of the global pandemic: a Chilean experience. *Innovation in Language Learning and Teaching*, 17(1), 114–129. <https://doi.org/10.1080/17501229.2021.1940187>
- Harris, L., Dargusch, J., Ames, K., & Bloomfield, C. (2022). Catering for 'very different kids': distance education teachers' understandings of and strategies for student engagement. *International Journal of Inclusive Education*, 26(8), 848–864. <https://doi.org/10.1080/13603116.2020.1735543>
- Islam, R. (2024). Analysis of English Learning Activities for Medical Students. *E-LINK JOURNAL*, 11(2), 209–215. <https://doi.org/10.30736/ej.v11i2.1128>
- Isnawira, S., & Sujannah, W. D. (2023). Vocational High School Students' Perception On The Use Of Task-Based Learning (TBL) In Speaking Class. *E-Link Journal*, 10(1), 1. <https://doi.org/10.30736/ej.v10i1.768>
- Johnston, E., Olivas, G., Steele, P., Smith, C., & Bailey, L. (2018). Exploring pedagogical foundations of existing virtual reality educational applications: A content analysis study. *Journal of Educational Technology Systems*, 46(4), 414–439.
- Juvonen, J., Lessard, L. M., Rastogi, R., Schacter, H. L., & Smith, D. S. (2019). Promoting social inclusion in educational settings: Challenges and opportunities. *Educational Psychologist*, 54(4), 250–270.
- Karacan, C. G., & Akoglu, K. (2021). Educational augmented reality technology for language learning and teaching: A comprehensive review. *Shanlax International Journal of Education*, 9(2), 68–79.
- Karagianni, E., & Drigas, A. (2023). New Technologies for Inclusive Learning for Students with Special Educational Needs. *International Journal of Online and Biomedical Engineering (IJOE)*, 19(05), 4–21. <https://doi.org/10.3991/ijoe.v19i05.36417>
- Kessler, G. (2018). Technology and the future of language teaching. *Foreign Language Annals*, 51(1), 205–218.
- Kholifah, S., & Buchori, A. (2023). Pelatihan Media Terbarukan Berbasis Virtual Reality Bagi Tenaga Kependidikan, Laboran dan Pustakawan di SMPN 3 Mranggen Demak. *ALKHIDMAH: Jurnal Pengabdian Dan Kemitraan Masyarakat*, 1(1), 63–71.
- Kormos, J., & Smith, A. M. (2023). *Teaching languages to students with specific learning differences* (Vol. 18). Channel View Publications.
- Kulesa, J., Induru, S., Hubbard, E., & Bhansali, P. (2024). The Conceptual Framework: A Practical Guide. *Hospital Pediatrics*, 14(11), e503–e508. <https://doi.org/10.1542/hpeds.2024-007794>
- Kurniawati, N., Sofarini, A., Maolida, E. H., & Jatmika, R. T. D. (2022). The Praxis Of Integrating Virtual Reality Into Vocabulary Teaching for Young Learners. *English Review: Journal of English Education*, 10(2), 371–380. <https://doi.org/10.25134/erjee.v10i2.6238>
- Lalotra, G. S., & Kumar, V. (2024). The Impact of Virtual Reality and Augmented Reality in Inclusive Education. In *Applied Assistive Technologies and Informatics for Students with Disabilities* (pp. 71–94). Springer.
- Makransky, G., Borre-Gude, S., & Mayer, R. E. (2019). Motivational and cognitive benefits of training in immersive virtual reality based on multiple assessments. *Journal of Computer Assisted Learning*, 35(6), 691–707. <https://doi.org/10.1111/jcal.12375>
- Martin, P. Y., & Jackson, S. (2002). Educational success for children in public care: advice from a group of high achievers. *Child & Family Social Work*, 7(2), 121–130.

- Mitchell, D., & Sutherland, D. (2020). *What Really Works in Special and Inclusive Education*. Routledge. <https://doi.org/10.4324/9780429401923>
- Morton, S., Pencheon, D., & Squires, N. (2017). Sustainable Development Goals (SDGs), and their implementation: A national global framework for health, development, and equity needs a systems approach at every level. *British Medical Bulletin*, 124(1), 81–90.
- Muchanga, M., & Chalawila, I. (2022). Challenges Experienced By Postgraduate Candidates in the Application of Conceptual Frameworks in Scientific Research. *International Journal of Scientific Research and Management*, 10(02), 2174–2183. <https://doi.org/10.18535/ijprm/v10i2.e102>
- Syahria, N., Andanty, F. D., Setiawan, R., Agustina, E., & Candra, B. C.. (2024). Issues of Teaching English for Lecturers of Non-English Departments: A Narrative Exploration of Teaching Experience. *E-Link Journal*, 11(1), 44–56. <https://doi.org/10.30736/ej.v11i1.1044>
- Ozel, E., Ganesan, M. Z., Daud, A. K. M., Darusalam, G. Bin, & Ali, N. A. B. N. (2018). Critical issue of teacher training in inclusive education. *Advanced Science Letters*, 24(7), 5139–5142.
- Pan, Z., Sun, Y., Yao, Z. W., & Li, M. (2021). Application of Virtual Reality in English Teaching. *2021 3rd World Symposium on Artificial Intelligence (WSAI)*, 64–71. <https://doi.org/10.1109/WSAI51899.2021.9486322>
- Prayudha, J., Nabila Maratus Salihah, & Ami Pradana. (2023). Integrating Information Communication Technology In English Language Teaching. *The Journal Of English Teaching For Young And Adult Learners*, 2(1), 29–35. <https://doi.org/10.21137/jeeval.2023.2.1.4>
- Puspitasari, D. (2019). *English Language Teaching in Inclusive Class: a Challenge*. <https://api.semanticscholar.org/CorpusID:229682578>
- Qassim, F., Nabi, B., & Malik, S. (2024). Teachers' Perception of Implementing Blended Learning at the University Level. *Sukkur IBA Journal of Educational Sciences and Technologies*, 03, 92–106. <https://doi.org/10.30537/sjest.v3i2.1345>
- Qorib, M. (2024). Analysis Of Differentiated Instruction As A Learning Solution In Student Diversity In Inclusive And Moderate Education. *International Journal of Reglement & Society (IJRS)*, 5(1), 43–55. <https://doi.org/https://doi.org/10.55357/ijrs.v5i1.452>
- Sanger, C. S. (2020). Inclusive pedagogy and universal design approaches for diverse learning environments. *Diversity and Inclusion in Global Higher Education: Lessons from across Asia*, 31–71.
- Sawalmeh, M. H., & Dey, M. (2023). Globalization and the increasing demand for spoken English teachers. *Research Journal in Advanced Humanities*, 4(2). <https://doi.org/10.58256/rjah.v4i2.1097>
- Sherman, W. R., & Craig, A. B. (2018). *Understanding virtual reality: Interface, application, and design*. Morgan Kaufmann.
- Shinde, S. T., & Shaikh, I. U. (2020). *Integration of ICT into the English Language Classroom*. <https://api.semanticscholar.org/CorpusID:215834998>
- Simamora, R. M., & Pasaribu, D. (2023). Education Should Embrace All Potential: Students' Reflective Essays on the Meaning of Merdeka Belajar. *Studies in Learning and Teaching*, 4(1), 68–87. <https://doi.org/10.46627/silet.v4i1.200>
- Simarmata, H. A., & Mayuni, I. (2023). Curriculum reform in Indonesia: from competency-based to freedom of learning. *International Journal Of Pedagogical Novelty*, 2(2), 1–13. <https://jurnal.pustakagalerimandiri.co.id/index.php/ijopnov/article/view/519/301>
- Southgate, E., Smith, S. P., Cividino, C., Saxby, S., Kilham, J., Eather, G., Scevak, J., Summerville, D., Buchanan, R., & Bergin, C. (2019). Embedding immersive virtual reality in classrooms: Ethical, organisational and educational lessons in bridging research and practice. *International Journal of Child-Computer Interaction*, 19, 19–29. <https://doi.org/10.1016/j.ijcci.2018.10.002>
- Tomlinson, C. A. (2017). *How to differentiate instruction in academically diverse classrooms*. Ascd.

- Tomlinson, C. A., & Imbeau, M. B. (2023). *Leading and managing a differentiated classroom*. Ascd. <https://files.ascd.org/pdfs/publications/books/Leading-and-Managing-A-Differentiated-Classroom-2ed-sample-pages.pdf>
- Vasconcelos, D. F. P. De, Dias, Y. C., Araújo, G. C., Lamounier Jr., E. A., & Malaquias, F. F. O. (2016, August 27). *Realidade Virtual Como Tecnologia De Apoio Ao Processo De Educação Inclusiva Para Deficientes Intelectuais*. <https://doi.org/10.17648/seb-2016-53318>
- Villalobos, S. E. C., Espino, L. A. C., & Martínez, A. G. (2019). *Reflexiones sobre la enseñanza inclusiva del inglés apoyada por tecnologías emergentes/Reflections on Technology-Supported Inclusive English Language Teaching*. <https://api.semanticscholar.org/CorpusID:195458767>
- Xie, Y., Liu, Y., Zhang, F., & Zhou, P. (2022). Virtual Reality-Integrated Immersion-Based Teaching to English Language Learning Outcome. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.767363>
- Yancey, K. B., Cambridge, B., & Cambridge, D. (2023). *Electronic Portfolios 2.0*. Routledge. <https://doi.org/10.4324/9781003444428>
- Yang, F.-C. O., Lo, F.-Y. R., Hsieh, J. C., & Wu, W.-C. V. (2020). Facilitating communicative ability of EFL learners via high-immersion virtual reality. *Journal of Educational Technology & Society*, 23(1), 30–49. <https://www.jstor.org/stable/26915405>
- Yanto, B., Supriyanto, A., Mustafa, S. R., & Risnofiardi. (2023). Pelatihan Peningkatan Inovasi Virtual Reality (VR) Millealab Bagi Guru SDN 05 Kampung Jawa Kota Solok. *Community Development Journal*, 4(2), 1782–1788. <https://doi.org/https://doi.org/10.31004/cdj.v4i2.13505>
- Ziegler, M., Matthews, A., Mayberry, M., Owen-DeSchryver, J., & Carter, E. W. (2020). From Barriers to Belonging: Promoting Inclusion and Relationships Through the Peer-to-Peer Program. *TEACHING Exceptional Children*, 52(6), 426–434. <https://doi.org/10.1177/0040059920906519>
- Zulherman, Z., Aji, G. B., & Supriansyah, S. (2021). Android-Based Animation Video Using Millealab Virtual Reality Application for Elementary School. *JPI (Jurnal Pendidikan Indonesia)*, 10(4). <https://doi.org/10.23887/jpi-undiksha.v10i4.29429>
- Zwane, S. L., & Malale, M. M. (2018). Investigating barriers teachers face in the implementation of inclusive education in high schools in the Gege branch, Swaziland. *African Journal of Disability*, 7(1), 1–12.