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Developing Immersive Virtual Reality-Based Experiential Learning to Improve Communication and Problem-Solving Skills of Slow Learners in Inclusive Elementary Schools

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ABSTRACT

Slow learners in inclusive elementary schools often experience difficulties in communication and problem-solving, partly due to limited access to interactive and contextual learning media. This study aimed to develop and evaluate an Immersive Virtual Reality (IVR)-based experiential learning model to enhance these skills. The study employed a Design-Based Research approach comprising needs analysis, design, implementation, and reflection phases. Participants included accompanying teachers and slow learner students from several inclusive elementary schools in East Java. Data were collected through expert validation sheets, observations, interviews, questionnaires, and pre-test and post-test instruments. Quantitative data were analyzed using paired sample t-tests, while qualitative data supported the refinement of the intervention. Expert validation indicated high feasibility, with average scores ranging from 4.7 to 4.8 across all aspects, categorized as "very worthy," including content suitability, visual design and interactivity, integration of experiential learning principles, usability, and appropriateness for slow learners. Effectiveness testing revealed significant improvements in students' communication skills (mean scores increasing from 66.7 to 83.0) and problem-solving skills (from 69.4 to 87.7), with $p = 0.000 < 0.05$ for both variables. The findings demonstrate that IVR-based experiential learning is both feasible and effective in enhancing communication and problem-solving skills among slow learners. By offering immersive, interactive, and meaningful learning experiences, this approach supports skill development in inclusive settings and highlights the potential of technology-enhanced pedagogy for diverse learners.

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1. INTRODUCTION

Inclusive education refers to an equitable education system that ensures all students have equal access to quality educational services, regardless of differences in abilities, backgrounds, or physical and mental conditions (Chusna & Harsiwi, 2024). Within inclusive elementary school settings, student diversity is recognized as a valuable asset that must be appropriately acknowledged and accommodated, including students with special learning needs such as slow learners (Samodro Adjie & Malawi, 2024). Slow learners are students whose intellectual abilities fall below the average range but who are not classified as having intellectual disabilities. Although they are able to participate in regular classroom instruction, they require additional time to comprehend concepts, process information, and apply knowledge in everyday contexts (Rahmawaty et al., 2023). Their learning processes are more effective when instructional materials are presented in concrete and sequential ways and supported by consistent guidance to facilitate understanding and retention (Sukinah et al., 2024). Therefore, inclusive education emphasizes the importance of providing appropriate support and implementing adaptive and flexible instructional approaches aligned with the characteristics and learning styles of slow learners, enabling them to engage meaningfully and learn optimally alongside their peers in regular classroom environments (Wahyuningsih et al., 2023).

In inclusive elementary school contexts, learning practices for slow learners continue to encounter various complex challenges (Latifah et al., 2023). Many teachers still rely on conventional instructional approaches that emphasize one-way verbal delivery, with limited consideration of students' diverse learning needs and individual characteristics (Mumpuniarti et al., 2020). Learning media are predominantly restricted to textbooks and simple instructional aids, which tend to be less engaging and interactive and fail to support active student involvement in the learning process (Hartini et al., 2017). Consequently, slow learners often exhibit low learning motivation and limited classroom participation, which hinders the development of essential competencies, particularly communication and problem-solving skills (Ariyanti et al., 2025). These skills are critical for both academic achievement and social interaction. Insufficient communication skills make it difficult for slow learners to express ideas, interact effectively with peers, and comprehend teachers' instructions (Eka Yuliana et al., 2024), while weak problem-solving abilities contribute to passive learning behaviors and a high dependence on external assistance when encountering learning difficulties (Okterina et al., 2025). Overall, these conditions indicate a substantial gap between the learning needs of slow learners and prevailing instructional practices, underscoring the need for more contextual, interactive, and student-centered learning approaches in inclusive education.

The rapid advancement of educational technology in the digital era provides new opportunities to address the learning challenges experienced by slow learners in inclusive classrooms (Sari & Munir, 2024). One promising innovation is Immersive Virtual Reality (IVR), a virtual reality based learning technology that enables students to engage in realistic, interactive, and three dimensional learning environments that simulate real-world contexts (Satria & Sutabri, 2025). IVR aligns closely with experiential learning principles, as it allows students to actively participate in learning through direct experience, exploration, and interaction rather than passive reception of information (Sukesi et al., 2024). This approach is particularly suitable for slow learners, who benefit from authentic, repetitive, and multisensory learning experiences to support deeper understanding and knowledge retention. Through safe and engaging virtual simulations, students can practise communication, decision-making, and problem-solving skills in various everyday situations without fear of failure (Aprianti et al., 2025). Therefore, Immersive Virtual Reality-based experiential learning functions not only as a visual support tool but also as an adaptive instructional medium that enhances learning engagement, fosters self-confidence, and supports the development of critical thinking and social skills among slow learners in inclusive education settings (Nurliasari et al., 2025). Experiential learning enhances the meaningfulness of technology-based learning through the stages of concrete experience, reflection, conceptualization, and active experimentation (Fadliyah et al., n.d.). The integration of Immersive Virtual Reality (IVR) with this approach creates active and contextual learning tailored to the needs of

slow learners (Huda et al., 2023). Realistic virtual environments support communication practice, problem solving, and the development of students' understanding, confidence, and social skills (Sukesi et al., 2024).

A growing body of research has reported that Virtual Reality (VR) technology can positively enhance students' motivation, learning outcomes, and social skills by providing engaging and immersive learning experiences (Nurliasari et al., 2025) (Zakiah et al., 2022). Nevertheless, existing studies have largely concentrated on the general use of VR in educational contexts, while empirical research that specifically develops Immersive Virtual Reality (IVR) grounded in experiential learning principles remains limited, particularly in relation to improving communication and problem-solving skills among slow learners in inclusive elementary schools (Huda et al., 2023). Moreover, insufficient attention has been given to how the integration of IVR and experiential learning can offer concrete, repetitive, and adaptive learning experiences that align with the unique characteristics and learning needs of slow learners (Andryansyah & Ningsih, 2021). This lack of targeted research reveals a critical gap in the literature and underscores the need for innovative, inclusive, and context-sensitive learning media that leverage advanced educational technologies to optimally support slow learners' development.

Based on the identified needs and research gaps, this study aims to develop Immersive Virtual Reality-based experiential learning to improve communication and problem-solving skills of slow learners in inclusive elementary schools. This learning medium is designed to provide concrete, interactive, and meaningful learning experiences that actively engage slow learners according to their characteristics and learning needs. By integrating IVR technology with the experiential learning framework, students are encouraged to learn through direct experience, reflection, conceptual understanding, and application in contexts that resemble real-life situations (Handayani et al., 2023). The novelty of this study lies in the systematic combination of immersive virtual reality and experiential learning specifically developed for slow learners in inclusive elementary settings, an area that remains limited in existing research. The findings of this study are expected to contribute theoretically to the development of inclusive learning models and practically to support teachers in designing engaging, adaptive, and inclusive learning practices that promote equal learning opportunities and optimal student potential.

2. METHODS

2.1 Research Design

This research uses Design-Based Research (DBR**)** as the primary approach. DBR is a research method oriented toward the development and refinement of educational products through an iterative process that involves direct collaboration between researchers and practitioners in real-life learning contexts. According to Reeves (2006), DBR has cyclical characteristics: problem identification, solution design, field implementation, and reflection to refine the design. The main objective of this approach is not only to produce innovative products but also to provide a theoretical understanding of the learning process. The reason for using the DBR design in this study is that the product developed —Immersive Virtual Reality based on Experiential Learning —requires a process of repeated trials and improvements to meet the needs of slow learners in inclusive elementary schools. This approach allows researchers to evaluate the effectiveness and feasibility of the product in a real-life context through direct teacher and student involvement, while ensuring the resulting product has high practical and empirical validity.

2.2 Participants

This study involved two mentor teachers from an inclusive elementary school and ten slow-learning students who served as trial subjects. The study was conducted at 10 inclusive elementary schools across East Java, selected based on their willingness to participate and their representativeness

of inclusive learning conditions in the area. Participants were selected using purposive sampling, taking into account the teachers' experience in teaching students with special needs and the students' ability to engage in technology-based learning.

2.3 Research Instruments

Product Feasibility Instrument: This instrument assesses the feasibility of the media. *Immersive Virtual Reality berbasis Experiential Learning*. The aspects evaluated include: (a) quality of learning content, (b) visual appearance and interactivity, (c) integration with experiential learning principles, and (d) ease of use for teachers and students. The assessment was conducted by media experts, learning experts, and inclusive education practitioners using a 1–5 Likert scale validation sheet. Communication and Problem-Solving Skills Instrument: This instrument is designed around communication skill indicators, including the ability to convey ideas clearly, listen and respond appropriately, and collaborate in a virtual context. Meanwhile, problem-solving skills are measured through the ability to recognise problems, design a solution strategy, and implement solutions independently in activities. *This* instrument consists of an observation sheet and a teacher questionnaire developed based on the theory of social and cognitive skills of slow learner students.

2.4 Data Collection

Data collection was carried out through several techniques according to the characteristics of DBR, namely Participatory observation, used to record student activities and responses while using Immersive Virtual Reality media, In-depth interviews, conducted with teachers to obtain qualitative information related to the effectiveness of the media and changes in student learning behavior, Questionnaires and validation sheets, used to collect quantitative data about product feasibility from experts and practitioners, Documentation, including student assignment results, interaction screenshots, and teacher reflection notes during the implementation process. The data collection procedure was carried out in stages following the DBR cycle, starting with needs data (initial analysis), then trial data (implementation), and finally reflection data (product revision).

2.5 Data analysis

Data analysis was conducted using a mixed-methods approach, in accordance with the exploratory and reflective characteristics of DBR. Qualitative data from observations and interviews were analysed using the Miles and Huberman model, including data reduction, data presentation, and conclusion drawing. This analysis aimed to identify interaction patterns, obstacles, and students' learning experiences while using the media. Quantitative data from validation and questionnaires were analysed using descriptive statistics to assess the product's feasibility and calculate the percentage of improvement in communication and problem-solving skills. The analysis results from both approaches were integrated in the design reflection stage to generate recommendations for more optimal product development.

3. FINDINGS AND DISCUSSION

3.1 Needs Analysis

The initial stage of this research focused on analysing needs and identifying student learning problems—slow *learner in* inclusive elementary schools. Based on observations in 10 inclusive schools in East Java, most students are slow learners. They have difficulty understanding complex verbal instructions, are less able to express ideas clearly, and often experience confusion when asked to solve real-world problems. The teacher also stated that conventional learning media have not provided meaningful, interactive learning experiences for these students. Interviews with two accompanying teachers indicate that the use of direct experience-based media is essential for inclusive learning. Teacher 1 (SDN Inklusif Surabaya) discloses:

"Children are slow learners" In my class, people often have difficulty understanding the material if it's only explained on the blackboard. They only understand it through hands-on practice or by experiencing the situation themselves (Respondent GR 1)."

Meanwhile, Teacher 2 (Sidoarjo Inclusive Elementary School) added:

"Experiential approaches like real-life simulations can help children learn more actively. If they can see and try things directly in a virtual environment, it's easier for them to understand (Respondent GR 2)."

Based on these findings, the researchers designed an initial prototype of Immersive Virtual Reality-based Experiential Learning (IVR-EL) featuring an interactive 3D learning environment. Each learning scenario is designed so that students can directly experience the stages of the learning process, namely experiencing, reflecting, understanding concepts, and applying them in new contexts. After the initial implementation, follow-up interviews were conducted with three students. One of them was a *slow learner*. Student A (grade 5) stated that he felt "more enjoyable learning in the virtual world because he could see directly and try new things without being afraid of making mistakes." Student B (grade 6) said that learning using VR made him "not get bored quickly and wanted to try other things."

Meanwhile, Student C (grade 4) said, "With VR glasses, I can learn while playing and easily understand the teacher's story." In general, these findings indicate that IVR-EL media can increase students' focus, engagement, and confidence in communicating and solving problems in virtual learning scenarios.

3.2 Media Development and Validation

Product Immersive *Virtual Reality berbasis Experiential Learning, then* validated by three experts, namely: (1) learning media expert, (2) inclusive education material expert, and (3) educational technology expert. The validation instrument uses a Likert scale of 1–5, with 1 = very inappropriate and 5 = very appropriate.

Table 1. Expert Validation Results for IVR-EL Products

Rated aspect	Media Member	Subject Matter Expert	Technologist	Rate-rate	Criteria
Suitability of learning content	4.6	4.8	4.8	4.8	Very Worthy
Visual design and interactivity	4.8	4.8	4.9	4.7	Very Worthy
Integration of experiential learning principles	4.7	4.8	4.8	4.7	Very Worthy
Ease of use	4.6	4.8	4.7	4.8	Very Worthy
Suitability for slow learner students	4.8	4.7	4.8	4.8	Very Worthy

Table 1 shows the expert validation results for the Immersive Virtual Reality-based Experiential Learning (IVR-EL) product from three validator groups: media experts, material experts, and technology experts. Overall, all assessed aspects were categorized as "very suitable," meaning the product met high quality standards in terms of content, appearance, and usability. The learning content suitability aspect was rated very good because the material presented was relevant and aligned with learning objectives. The visual design and interactivity also received high ratings, indicating the media's attractive appearance and ability to actively engage users. Furthermore, the integration of experiential learning principles demonstrated that the product successfully implemented experiential learning effectively.

3.3 Trial Implementation

Ease of use received high praise, indicating the media is easy to operate by users of various ability backgrounds. Finally, the suitability aspect for slow learners received a very positive score, indicating that the IVR-EL product is adaptive to the learning needs of students with mild learning disabilities. Overall, the expert validation results confirm that the IVR-EL product is highly suitable for use in inclusive elementary schools.

Table 2. Data Description

Statistic	Value
Sample Size (N)	10
Mean	146
Mode	13
Standard Deviation (S)	1.15

Table 2 presents the descriptive statistical data for the research sample. The data shows that the study involved a total of 10 participants ($n=10$). The analysis of central tendency revealed a mean (average) score of 146, while the mode—representing the most frequently occurring value—was recorded at 13. Furthermore, the data distribution shows a standard deviation (s) of 1.15. This low standard deviation indicates that the data points are relatively close to the mean, suggesting a high level of consistency among the subjects' scores. These descriptive statistics provide the necessary baseline profile of the participants before conducting the inferential analysis seen in the subsequent paired sample t-test.

Table 3. Paired Sample t-test results

Variables	Rate-rate Pre-test	Rate-Rate Post-test	Sig. (p)	Information
Communication Skills	66.7	83.0	0.000 < 0.05	Significant
Problem-Solving Skills	69.4	87.7	0.000 < 0.05	Significant

Table 3 shows the results of a paired sample t-test used to determine differences in student abilities before and after using Immersive Virtual Reality-based Experiential Learning (IVR-EL) media. The analysis showed a significant improvement in both measured variables: communication skills and problem-solving abilities. The average score after treatment was higher than before the media use, and the statistical test results indicated that the difference was statistically significant. Thus, it can be interpreted that the use of IVR-EL media has a positive and effective impact on improving the communication skills and problem-solving abilities of slow-learners in inclusive elementary schools. This confirms that experiential learning through immersive technology can strengthen student engagement and understanding in the learning process.

Discussion

The results of this study indicate that the application of Immersive Virtual Reality based on Experiential Learning (IVR-EL) significantly improves students' communication and problem-solving skills. slow learner in inclusive elementary schools. This improvement is evident from the statistically significant difference in average pretest and posttest scores for both primary variables. This finding reinforces the view that experiential learning in a virtual environment can create more interactive, meaningful, and tailored learning conditions to the needs of students with special needs. This finding aligns with research conducted by Makransky & Petersen (2021), which shows that virtual reality-based learning can improve engagement and students' conceptual understanding because it provides a more

in-depth learning experience (immersive learning experience). In addition, studies by Rachmadtullah et al (2020) also support the results of this study by emphasising that the use of VR in the context of inclusive education is able to accommodate the dominant visual and kinesthetic learning styles of students. slow learner, so that they can more easily understand the concept through direct simulation.

Theoretically, the results of this study are consistent with the Experiential Learning theory put forward by Kolb (an effective learning process occurs when students experience a learning cycle that includes four stages: concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Jones-Roberts & Bechtold, 2024).In the context of this research, students learn concrete experience through virtual simulations, then reflect through teacher-guided activities, understand the concept gradually, and finally apply this knowledge in problem-solving in a virtual environment (Cóndor-Herrera & Ramos-Galarza, 2020). This process explains why communication and problem-solving skills improved significantly after using IVR-EL. From an inclusive pedagogy perspective, the results of this study emphasise the importance of adapting learning media to ensure the full participation of all students, including those with learning disabilities (D'Elia et al, 2025; Díaz, Morgado, & Seale, 2024). IVR-EL enables learning differentiation through visual and interactive experiences that can be tailored to each student's abilities (Matovu et al, 2022; Lowell & Yan, 2023). Teachers also acknowledged that this medium makes it easier for them to facilitate two-way communication, as students are more willing to speak and express ideas in a safe, enjoyable virtual environment.

Another advantage of using IVR-EL is its ability to present learning situations that resemble the real world without the risks or social pressures that students often encounter—slow *learner (*Crogman et al, 2025; Kwon, 2018). Virtual environments provide an inclusive and stigma-free learning space, enabling students to learn with greater confidence and independence. This is consistent with findings by Shin, Ko, & Shin (2022), who state that virtual immersion can increase empathy, self-confidence, and motivation for students to engage in collaborative learning. Another positive impact is seen in the improvement of social skills integrated into the communication process between students during learning (Liu et al., 2024). Interactions in the virtual environment help them practice expressing opinions, listening to their peers, and collaborating to solve challenges presented in the simulation. This indicates that IVR-EL functions not only as a learning medium but also as a means of strengthening students' social and emotional character (Chiang, 2021).

The findings of this study confirm that the implementation of Immersive Virtual Reality based on Experiential Learning (IVR-EL) has a positive and significant influence on improving students' communication and problem-solving skills. *slow learners* in inclusive elementary schools (Back, Tinga, & Louwerse, 2021). Immersive and contextual learning experiences can stimulate students' cognitive and affective abilities simultaneously. Furthermore, observations and interviews with teachers and students reinforce this quantitative data (Chen & Xu, 2024). The teacher stated that the use of Immersive Virtual Reality media based on Experiential Learning (IVR-EL) makes it easier for slow learners to understand the material because they can see, hear, and experience the learning situation firsthand, which was previously only explained verbally (Miguel-Alonso, 2024). Students who were initially passive became more active, asking questions and showing high enthusiasm during the learning process. This phenomenon confirms that immersive technology-based learning experiences can create deep emotional and cognitive engagement, thereby strengthening students' knowledge retention and social skills. Conceptually, the results of this study demonstrate the principle of experiential *learning and* immersive technology. Practically, this study provides empirical evidence that Immersive Virtual Reality-based Experiential Learning can be a strategic alternative for developing students' communication potential and critical thinking skills. *Slow learner in* inclusive elementary schools.

The improvement in students' communication skills can be attributed to the experiential and immersive characteristics of IVR-EL, which allow learners to actively engage in meaningful learning situations rather than passively receiving information. Through immersive virtual environments, students are encouraged to express ideas, respond to contextual stimuli, and interact with peers,

thereby strengthening functional communication abilities. This finding supports immersive learning theory, which posits that presence, interaction, and embodied experiences in virtual environments enhance learner engagement and communication competence. In addition, the development of problem-solving skills is closely aligned with Kolb's experiential learning model, as students move through cycles of concrete experience, reflective observation, abstract conceptualisation, and active experimentation while navigating simulated challenges. Compared with previous VR studies in inclusive education that mainly emphasised motivation or conceptual understanding, the present study extends existing literature by demonstrating that the integration of immersive virtual reality and experiential learning can systematically enhance both communication and problem-solving skills among slow learners in inclusive elementary school settings.

Despite these positive findings, several implementation challenges and research limitations should be considered. The application of IVR-EL requires sufficient technological infrastructure, access to virtual reality devices, and teachers' pedagogical readiness, which may present barriers in schools with limited resources. These challenges indicate the need for institutional and policy-level support to ensure equitable access to immersive learning technologies across inclusive educational settings. Furthermore, this study was conducted with a relatively small sample size, a short intervention duration, and without a control group, which may limit the generalisability of the results. Therefore, future research should involve larger samples, longer implementation periods, and experimental designs with comparison groups to strengthen empirical evidence. Nevertheless, the findings have important implications for teacher training and inclusive curriculum design, highlighting the need for professional development programmes that support the pedagogical integration of immersive technologies and curriculum frameworks that accommodate diverse learner characteristics in inclusive educational contexts.

4. CONCLUSION

The findings of this study indicate that the development of immersive Virtual Reality–based experiential learning effectively enhances the communication and problem-solving skills of slow learners in inclusive elementary schools. Through interactive, contextual, and experience-based learning environments, students actively engage in the learning process, achieve deeper conceptual understanding, and develop both cognitive and social competencies within a safe and supportive setting. These results highlight the potential of immersive Virtual Reality as an innovative, student-centred learning medium that can strengthen inclusive curriculum design and instructional practices. Therefore, educators are encouraged to integrate this technology into classroom instruction, while schools and policymakers should support its implementation through curriculum alignment, teacher professional development, and adequate technological infrastructure. Future research is recommended to explore the long-term effectiveness of immersive Virtual Reality based experiential learning, its application to other groups of students with special educational needs, and its influence on affective outcomes such as learning motivation and self-confidence.

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Conflicts of Interest: This research has no conflict and all research procedures, starting from selecting the research location to obtaining research permits, have been carried out in accordance with applicable provisions.

REFERENCES

Andryansyah, & Ningsih, P. (2021). *Penerapan Model Experiential Learning Pada Pembelajaran IPA*. 4.

Aprianti, Y., Ramdani, I. L. A., Ali, M., Rifki, M., & Utomo, R. B. (2025). Perspektif Teori Konstruktivisme Vygotsky Terhadap Kemampuan Bersosialisasi Siswa Slow Learner Di Sekolah

Dasar Inklusi. *DWIJA CENDEKIA: Jurnal Riset Pedagogik*, *9*(1), 135. https://doi.org/10.20961/jdc.v9i1.99167

Back, T., Tinga, A., & Louwerse, M. (2021). Learning in immersed collaborative virtual environments: design and implementation. Interactive Learning Environments, 31, 5364 - 5382. https://doi.org/10.1080/10494820.2021.2006238 .

Chen, C., & Syu, J. (2024). Effects of integrating a role-playing game into a virtual reality-based learning approach on students' perceptions of immersion, self-efficacy, learning motivation and achievements. Br. J. Educ. Technol., 55, 2339-2356. https://doi.org/10.1111/bjet.13436.

Chiang, T. (2021). Investigating Effects of Interactive Virtual Reality Games and Gender on Immersion, Empathy and Behavior Into Environmental Education. Frontiers in Psychology, 12. https://doi.org/10.3389/fpsyg.2021.608407 .

Chusna, N. L., & Harsiwi, N. E. (2024). Layanan Pembelajaran Anak Slow Learner di Kelas 4 Sekolah Dasar. *ALENA-Journal of Elementary Education*, *2*(2), 150–159.

Cóndor-Herrera, O., & Ramos-Galarza, C. (2020). The impact of a technological intervention program on learning mathematical skills. Education and Information Technologies, 26, 1423 - 1433. https://doi.org/10.1007/s10639-020-10308-y .

Crogman, H., Cano, V., Pacheco, E., Sonawane, R., & Boroon, R. (2025). Virtual Reality, Augmented Reality, and Mixed Reality in Experiential Learning: Transforming Educational Paradigms. Education Sciences. https://doi.org/10.3390/educsci15030303 IF: 2.6 Q1 B3.

D'Elia, P., Stalmach, A., Di Sano, S., & Casale, G. (2025). Strategies for inclusive digital education: problem/project-based learning, cooperative learning, and service learning for students with special educational needs. Frontiers in Education. https://doi.org/10.3389/feduc.2024.1447489

Díaz, M., Morgado, B., & Seale, J. (2024). Access and Participation: The use of Technologies as tools for Inclusion by Spanish University Lecturers. Australasian Journal of Educational Technology. https://doi.org/10.14742/ajet.8178.

Dwi Ariyanti, S., Dwi Putra, S., Zuhria, F., Youlandi Rahayu Sulistiyawati, D., Studi Pendidikan Guru Sekolah Dasar, P., Ilmu Pendidikan, F., & PGRI Wates, I. (2025). Teacher Challenges in Teaching Slow Learners. *ALENA – Journal of Elementary Education*. https://doi.org/10.59638/jee.v3i2.372

Eka Yuliana, R., Ediyatno, & Safiul Ummah, U. (2024). Interaksi Sosial Siswa Slow Learner di Sekolah Penyelenggara Pendidikan Inklusif di SDN Kota Malang. *Didaktik : Jurnal Ilmiah PGSD FKIP Universitas Mandiri*.

Fadliyah, L. S., Fanani, A., & Surabaya, A. B. (n.d.). *Model Experiential Learning dalam Menumbuhkan Kemampuan High Order Thinking Skills (HOTS)*.

Guerra-Tamez, C. (2023). The Impact of Immersion through Virtual Reality in the Learning Experiences of Art and Design Students: The Mediating Effect of the Flow Experience. Education Sciences. https://doi.org/10.3390/educsci13020185 .

Han, I., Shin, H., Ko, Y., & Shin, W. (2022). Immersive virtual reality for increasing presence and empathy. J. Comput. Assist. Learn., 38, 1115-1126. https://doi.org/10.1111/jcal.12669.

Handayani, R., Yusnida Ritonga, W., Anas, M. H., Tinggi, S., Islam, A., Medan, A.-H., Tarbiyah, I., Keguruan, D., Guru, P., & Ibtidaiyah, M. (2023). Konsep Pembelajaran Anak Inklusif dan Strategi Pembelajaran untuk Anak Inklusif. *Jurnal Pendidikan Tambusai*.

Hartini, A., Widyaningtyas, D., & Mashluhah, M. I. (2017). Learning Strategies for Slow Learners Using The Project Based Learning Model in Primary School. *Jurnal Pendidikan Inklusi*, *1*.

Huda, F., Fery Efendi, J., Budiman, A., Ichda Wahyuni, H., Setiyowati, A., Choliq, I., & Wijaya, M. F. (2023). Pengembangan Inovasi Pembelajaran Virtual Reality Account Officer Customer Servicer Mahasiswa Slow Learner di UMSurabaya. *Aksiologiya: Jurnal Pengabdian Kepada Masyarakat*, *7*(4). https://doi.org/10.30651/aks.v7i4.18315

Jones-Roberts, C., & Bechtold, C. (2024). Experiential learning in higher education. Journal of Technology-Integrated Lessons and Teaching, 3(2), 53-63.

Kwon, C. (2018). Verification of the possibility and effectiveness of experiential learning using HMD-based immersive VR technologies. Virtual Reality, 23, 101-118. https://doi.org/10.1007/s10055-018-0364-1.

Latifah, A. N., Pratiwi, I. A., & Kuryanto, M. S. (2023). Peran Guru dalam Menghadapi Siswa Slow Learner di Sekolah Dasar. *Jurnal Basicedu*, *7*(4), 2650–2662. https://doi.org/10.31004/basicedu.v7i4.5895

Liu, J., Mak, P., Chan, K., Cheung, D., Cheung, K., Fong, K., Kor, P., Lai, T., & Maximo, T. (2024). The Effects of Immersive Virtual Reality–Assisted Experiential Learning on Enhancing Empathy in Undergraduate Health Care Students Toward Older Adults With Cognitive Impairment: Multiple-Methods Study. JMIR Medical Education, 10. https://doi.org/10.2196/48566 .

Lowell, V., & Yan, W. (2023). Applying Systems Thinking for Designing Immersive Virtual Reality Learning Experiences in Education. TechTrends. https://doi.org/10.1007/s11528-023-00922-1.

Makransky, G., & Petersen, G. (2021). The Cognitive Affective Model of Immersive Learning (CAMIL): a Theoretical Research-Based Model of Learning in Immersive Virtual Reality. Educational Psychology Review, 33, 937 - 958. https://doi.org/10.1007/s10648-020-09586-2

Matovu, H., Ungu, D., Won, M., Tsai, C., Treagust, D., Mocerino, M., & Tasker, R. (2022). Immersive virtual reality for science learning: Design, implementation, and evaluation. Studies in Science Education, 59, 205 - 244. https://doi.org/10.1080/03057267.2022.2082680 .

Miguel-Alonso, I., Checa, D., Guillen-Sanz, H., & Bustillo, A. (2024). Evaluation of the novelty effect in immersive Virtual Reality learning experiences. Virtual Reality, 28, 1-23. https://doi.org/10.1007/s10055-023-00926-5

Mumpuniarti, M., Handoyo, R. R., Pinrupitanza, D. T., & Barotuttaqiyah, D. (2020). Teacher's pedagogy competence and challenges in implementing inclusive learning in slow learner. *Cakrawala Pendidikan*, *39*(1), 217–229. https://doi.org/10.21831/cp.v39i1.28807

Nurliasari, L., Kurniawan, E. H., & Muchyidin, M. S. (2025). Millealab as A Virtual Reality-based Learning Platform for Slow Learners Students. *Jurnal Paedagogy*, *12*(1), 110. https://doi.org/10.33394/jp.v12i1.13692

Okterina, E., Farah, D. N., Zila'aidah, N., Widajati, W., & Fauzan, R. A. (2025). Pengembangan Busy Book Digital untuk Mengoptimalkan Kemampuan Kognitif Anak Slow Learner. *Kalam Cendekia: Jurnal Ilmiah Kependidikan*, *13*.

Rachmadtullah, R., Tanod, M. J. T. M. J., Rasmitadila, R., Irawan, N., McNeilly, A., & Suharni, S. (2024). Elementary School Teachers' Perspectives on Utilizing Artificial Intelligence for Developing Learning Media. Journal of Integrated Elementary Education, 4(1), 71-82.

Rahmawaty, S. N., Karsidi, R., & Yuwono, J. (2023). Web-Based Syllable Reading Learning Media (BASUKA) For Beginning Reading For Slow Learner Students At Elementary School Level. In *Journal of Disability* (Vol. 3, Issue 2).

Samodro Adjie, B., & Malawi, I. (2024). Analisis Faktor Penyebab Dua Anak Slow Learner di SD Negeri Bacem Kelas VI. *Jurnal Pendidikan Tambusai*.

Sari, A. P., & Munir, M. (2024). Pemanfaatan Teknologi Digital dalam Inovasi Pembelajaran untuk Meningkatkan Efektivitas Kegiatan di Kelas. *Digital Transformation Technology*, *4*(2), 977–983. https://doi.org/10.47709/digitech.v4i2.5127

Satria, A., & Sutabri, T. (2025). Pengembangan Pembelajaran Virtual Reality Berbasis Metaverse Menggunakan Metode ADDIE. *Router : Jurnal Teknik Informatika Dan Terapan*, *3*(2), 01–09. https://doi.org/10.62951/router.v3i2.409

Sukesi, K., Brillian Pintakami, L., Wahyu Satriawan, P., & Pertanian, F. (2024). Pemanfaatan Virtual Reality Sebagai Pendukung Pembelajaran Inklusif: Studi Kasus Siswa Berkebutuhan Khusus

Spektrum Slow Learner. *Indonesian Journal of Engagement, Community Services, Empowerment and Development*, *4*(1). https://doi.org/10.53067/ijecsed.v4i1

Sukinah, Mumpuniarti, & Murdiyani, K. K. (2024). Learning Accommodation for Slow Learners in Inclusive Elementary Schools. *INKLUSI*, *11*(2), 247–266. https://doi.org/10.14421/ijds.110207

Wahyuningsih, B. Y., Made, N., & Suranti, Y. (2023). Strategi Pembelajaran Efektif Bagi Siswa Slow Learner: Sebuah Kajian Literatur. *Indonesian Journal of Elementary and Childhood Education*, *4*.

Wanabuliandari, S., Wardono, Susilo, B. E., Bintoro, H. S., & Mariani, S. (2025). A Systematic Literature Review on Slow Learners' Problem-Solving in Mathematics Education. In *International Journal of Learning, Teaching and Educational Research* (Vol. 24, Issue 3, pp. 699–724). Society for Research and Knowledge Management. https://doi.org/10.26803/ijlter.24.3.33

Zakiah, L., Supena, A., & Wulandari, N. (2022). Parents Collaborative Approach to Handle Slow Learners in The Inclusive Elementary Schoo. *Jurnal Ilmiah Sekolah Dasar*, *6*(1), 116–124. https://doi.org/10.23887/jisd.v6i1.41429