



Development of the KALISAD Application to Improve Structured Sentence Writing Skills among Deaf Students

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Abstract

Children with hearing impairments often experience barriers in accessing language, which affects their mastery of grammar and sentence structure. These limitations make it difficult for deaf students to construct sentences according to Subject, Predicate, Object, and Complement/Adverbial (SPOK) patterns. In addition, conventional learning methods often reduce students' interest and make it difficult for them to understand sentence structure properly. Therefore, digital learning media are needed to support visual-based learning that suits the characteristics of deaf students. This study aimed to develop the KALISAD application to improve structured sentence writing skills among deaf students and to facilitate a more interactive, attractive, and understandable learning process. This research employed a research and development (R&D) design using the ADDIE model, which consists of analysis, design, development, implementation, and evaluation stages. The study used a pretest-posttest approach with quantitative data analysis. The subjects were eight deaf students at the senior high school level of SLB A. Data were collected through observation, interviews, tests, expert validation sheets, and practicality questionnaires. The validation results showed that the KALISAD application was very valid and feasible for use. The instrument validation reached 94.59%, material expert validation 93.18%, media expert validation 94.38%, and deaf education expert validation 96.88%. The practicality score was 88.89%, indicating that the application was practical to use. The effectiveness test using the N-Gain formula showed an average score of 0.42, categorized as moderate. These findings indicate that the KALISAD application is effective, practical, interactive, and appropriate for improving structured sentence writing skills among deaf students.

Introduction

Writing skills are an important aspect of literacy skills because they function as a means communication development idea, And reflection cognitive (Dewi, 2025; Vicente-Yagüe Jara et al., 2023; Teng & Yue, 2023; Siregar, 2025). Writing helps students' intellectual growth in addition to providing opportunities for pour out thoughts in written form. To be successful Academically and socially in an educational environment, one must be proficient in writing. According to (Arifin et al., 2021), structured writing practice is able to improve mastery of grammar, vocabulary selection, use of punctuation, and more cohesive sentence structure And coherent. Through activity write, Students are encouraged to pay attention to the accuracy of language forms and organize sentences coherently, so that their language skills develop better (Sahnan & Daulay, 2025; Bacacao, 2025; Naini & Ulya, 2025).

In the context of education, writing skills are one of the basic competencies of language literacy that must be developed systematically, including for students with special needs (Alahmari et

al., 2025; Barianty et al., 2025; Nugrahani et al., 2025; Utegenova & Berkina, 2023). For deaf students, writing skills play a strategic role as the primary means of expressing their ideas, feelings, and understanding of written language (Fadilah et al., 2025; Naini & Ulya, 2025; Saaty, 2023; Khudaverdiyeva, 2025; Biermann et al., 2022; Ramzan et al., 2023). Limited hearing ability causes deaf students to rely more on visual and written communication in the learning process. To maximize learning objectives, teaching writing to deaf students requires unique techniques tailored to their characteristics and learning needs (Sriwidiastuty et al., 2024). Deaf students struggle to understand and apply written grammar rules that conform to linguistic standards as they grow. According to research by Ramdan & Tati (2018), deaf students struggle to construct sentences correctly using the Subject-Predicate-Object-Adverb (SPOK) pattern.

Children with hearing impairments may have a variety of hearing impairments, including varying degrees of hearing loss and other conditions that can contribute to poor writing skills (Khasawneh, 2024; Mansutti et al., 2023; Mansutti et al., 2023; Martens et al., 2023). Children with hearing impairments must rely on visual abilities to understand receptive language. However, because they have difficulty hearing spoken information and because not everything they see is understandable, deaf students sometimes have inadequate language acquisition. Consequently, they struggle to produce written language that conforms to Indonesian grammatical standards. If not addressed appropriately, this issue can lead to poor written communication skills, delayed literacy development, and barriers to social and academic success (Bukhari et al., 2023; Katsarou et al., 2024; Sabilla & Kaniadewi, 2025; Jiang et al., 2022; Singun, 2025; Nair et al., 2023).

For students to express their thoughts effectively and coherently, writing skills must be developed through organized and ongoing practice. Consistent writing practice has been shown to improve mastery of grammar, vocabulary, punctuation, and sentence structure (Fadilah et al., 2025; Leotta & Ahmad, 2025; Imaniah, 2022). For deaf children, improving writing skills is crucial because writing serves as the primary means of communication and language expression, compensating for limited access to spoken language. By improving writing skills, deaf children can develop language skills, think logically, and participate more optimally in academic and social activities (Safitri et al., 2022; Potier & Givens, 2023; Secora et al., 2023; Coppola & Walker, 2025; Nurapriani & Darmawan, 2025).

One effort that can be made is through the use of digital-based technology. According to (Rohmah & Harsiwi, 2024), optimal use of technology can create a more inclusive learning environment and empower deaf children to develop and reach their full potential. The use of interactive learning applications designed visually and systematically is believed to help deaf students understand language structure and write sentences more easily and engagingly.

Based on field observations, researchers found that the writing learning process for deaf students at SLB A still faces various obstacles. The learning process tends to use conventional methods with limited media, making it less able to accommodate the learning needs of students who rely on visual aspects. Furthermore, the use of technology in learning is still suboptimal, particularly in the form of interactive applications that can help students understand sentence structure and develop writing skills.

Referring to the problems that exist in SLB A in December 2025, the KALISAD application was developed as a digital technology that has high functionality, accessibility, and capacity to offer interactive educational resources tailored to the needs of each user (Mueller-Roterberg, 2018; Tacda et al., 2025; Kamal, 2026; Llovido et al., 2024; Kaliraj & Devi, 2022). This application allows the integration of several visual components that suit the learning styles of

deaf students to improve their understanding of correct sentence construction. The use of digital technology that does not require special installation and has interactive features such as automatic spelling correction, visualization of materials with visual cues such as images and videos, and a writing progress tracking system, is what makes this research new.

Several previous studies have shown that deaf students can benefit from using digital applications to improve their writing skills. Learning applications are crucial for facilitating a more dynamic, personalized, and engaging learning experience. This aligns with the findings of Septiawati et al. (2021):

“Learning applications combine interesting visuals that stimulate cognitive processes, help memory retention, and provide guidance for students in interpreting and associating images with words.”

This opinion confirms that visual-based learning support and consistent interventions can stimulate cognitive processes, improve language comprehension, and help deaf children associate visual symbols with linguistic meaning. Research (Putri & Pangastuti, 2025) shows how the academic, communicative, and social skills of deaf children can be significantly improved through the rigorous use of sign language, visual aids in the classroom, and collaboration between families and schools.

It is hoped that deaf students will have access to more inclusive and productive learning opportunities and build structured sentence writing skills. in accordance with Indonesian grammar through the responsible use of digital technology. Thus, the development of the KALISAD application is a planned step to maximize the use of ICT in education while simultaneously improving teaching standards for deaf students.

Methods

Research Approaches and Types

This research uses a quantitative approach with a product development or *Research and Development* (R&D) approach, which aims to design and evaluate the effectiveness of the resulting product. According to Sugiyono (2016) , this research is a method that focuses on product creation and assessment to what extent. where the product successfully achieves its desired goals.

This method uses quantitative tools such as *pretest-posttest* and statistical analysis to evaluate the product's efficacy, validity, and practicality. The product in question is software, such as a learning application. The focus of this research is to design an application for use as a learning application in education, with the primary goal of improving the quality of learning and developing writing skills in deaf students. The development process includes product creation, validation, and trial testing to ensure its quality and effectiveness in learning.

The KALISAD application product, created using the ADDIE model approach, is the result of this research. In 1967, Reiser and Mollanda introduced the ADDIE paradigm, which aims to provide a flexible and efficient learning system. The goal of this model is to design and develop training tools and infrastructure that can optimally support the learning process. This method emphasizes individual learning and offers a methodical framework for developing interactive educational resources tailored to the needs of deaf children. There are five developmental phases in the ADDIE model (Sugiyono, 2016) , namely:

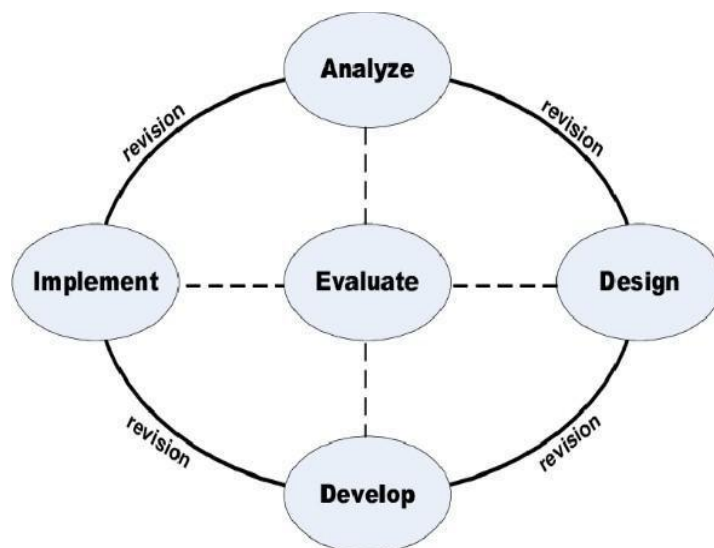


Figure 1. ADDIE Model

In developing learning applications, the ADDIE model is used as a systematic framework for designing, developing, and implementing learning products. This model consists of five main stages: Analysis, Design, Development, Implementation, and Evaluation, which help educators and developers ensure that learning materials meet learner needs and learning objectives. By following these stages, every aspect of learning can be carefully planned to produce an effective learning experience (Spatioti et al., 2022) .

Research Design

Study This use design *One Group Pretest-Posttest Design*, in design experimental This only there is One group subject, and not There is group control. By comparing *pretest* and *posttest* findings, this method allows for analysis of improvements in the ability to write sentence structures in deaf students.

Development Model

Stages development study This based on the ADDIE model according to Sugiyono, In the ADDIE model there is no there is stage diffusion ; only stage assessment included. Therefore that, research This follow stages that have been determined. Fifth step the explained as following: a) Analysis; b) Design/ Planning; c) Development; d) Implementation; d) Evaluation

Research Subjects and Locations

Subject in study This consists of from : a) Eight student deaf in SLB A who have obstacle hearing medium and heavy as well as need support special in learning write sentence; b) Eligibility validator instruments, individuals with background Special Education background that assesses eligibility all instrument; c) Subject matter expert, individual with background behind skill in Indonesian Language Education Sector, which is responsible for For evaluate suitability content material learning; d) Media experts, individuals with background behind in field Educational Technology that has competence in development application learning, which assesses quality design and feasibility application from side technical and aesthetic; e) Deaf PLB Expert with background behind skill in special education field child deaf, who is on duty For evaluate suitability content material learning; f) Practicing teacher student deaf, educators who have experience direct in teach student deaf, which provides input based on practicality use application in the learning process in class

Study This was carried out at SLB A which is located in one of the Regency Sidoarjo, East Java. SLB A is formal institutions designated for child in need special.

Data collection technique

Methods used For collect data in approach study development includes: a) Questionnaire Expert Validation; b) Test (*Pretest and Posttest*)

Instrument Data collection

Following is details instruments used : 1) Validation Sheet Instrument Study; 2) Material Expert Validation Sheet; 3) Media Expert Validation Sheet; 4) Deaf PLB Expert Validation Sheet; 5) Practicality Sheet Application; 6) Effectiveness Sheet Application (*Pretest Posttest*)

Implementation Sheet Learning with the KALISAD Application Model.

Results and Discussion

Product KALISAD Application

Products produced in study This in the form of learning media based application named KALISAD. Application This developed For help increase ability student deaf in compile structure sentence simple SPO and SPOK patterns.

Development The KALISAD application is based on the results observations and interviews that show that student deaf Still experience difficulty in compile structure sentence in a way right. Difficulty the covering difficulty determine word order in sentences, understanding element subject, predicate, object, and adverb, as well compile pattern sentence simple in a way coherent.

Validity Product

Results of validation show that KALISAD application includes very valid good category from aspect validation instrument reached 94.59%, validation expert material reached 93.18%, validation media experts reached 94.38%, while validation deaf PLB expert reached 96.88%. This result show that application the fulfil standard eligibility in matter content learning, visual design, and interactivity.

Table 1. Validation Results Instrument Study

No	Aspect Evaluation	Percentage (%)
1	Subject Matter Expert Validation	95%
2	Media Expert Validation	95%
3	PLB Expert Validation	95%
4	Expertise Practicality	95%
5	Completeness aspect evaluation	95%
6	Effectiveness Pretest Posttest	95%
7	Implementation Learning with the KALISAD Model	92.5%
Average		94.59%

The data in Table 1 indicate that the research instruments achieved an average validity score of 94.59%, which falls into the very valid category. This result confirms that the instruments used to evaluate the application were appropriate, comprehensive, and reliable for measuring validity, practicality, and effectiveness. The slightly lower score for learning implementation (92.5%) still remained within the very valid range, indicating strong feasibility for classroom use.

Table 2. Results of Material Expert Validation

No	Aspect Evaluation	Percentage (%)
1	Material	92.86%
2	Learning	92.86%
3	Linguistics	87.5%
4	Visual Design	100%
5	Clarity of Language	100%
6	Compliance Rules	75%
7	Legibility	75%
8	Accuracy of Terms	100%
9	Language Consistency	100%
10	Effectiveness Sentence	100%
Average		93.18%

Table 2 shows that material validation obtained an average score of 93.18%, categorized as very valid. The highest scores were found in visual design, language clarity, term accuracy, language consistency, and sentence effectiveness (100%), indicating excellent instructional quality. However, rule compliance and legibility received relatively lower scores (75%), suggesting minor revisions were needed to improve readability and alignment with formal language rules.

Table 3. Media Expert Validation Results

No	Aspect Evaluation	Percentage (%)
1	Programming	93.75%
2	Presentation	95%
3	Appearance Applications / Graphics	93.75%
4	Linguistics	96.88%
5	Effectiveness Application	91.67
Average		94.38%

Based on Table 3, the media validation score reached 94.38%, indicating that the application is highly feasible from a technical perspective. The strong scores in programming and graphics demonstrate stable system performance and attractive visual design. The high linguistic score suggests that the instructions and interface are easy to understand, which is particularly important for deaf learners who rely heavily on visual communication.

Table 4. Results of Validation by Deaf PLB Experts

No	Aspect Evaluation	Percentage (%)
1	Compliance Characteristics Student Deaf	93.75%
2	Aspect Special Education Learning	100%
Average		96.88%

Table 4 demonstrates the highest validation score among all expert groups, with an average of 96.88%. This result indicates that the KALISAD application strongly aligns with the learning characteristics of deaf students. The perfect score in special education aspects confirms that the application successfully integrates accessibility principles, visual learning strategies, and learner-centered instructional design.

Apart from aspect eligibility, score tall This show that application the in accordance with principle custom design For child deaf. High presentation and language scores also indicate that application the easy used for child deaf in understand arrangement sentence.

Practicality Product

Based on results evaluation practicality, obtained percentage by 88.89% with "sufficient" category practical". The results show that easy KALISAD application used and worthy implemented in learning write sentence structured for student deaf.

Table 5. Practical Results

No	Aspect Evaluation	Percentage (%)
1	Content Quality and Purpose	85.71%
2	Engineering Quality	80%
3	Quality Learning	97.92%
Average		88.89%

Table 5 indicates that the KALISAD application obtained an average practicality score of 88.89%, categorized as practical. The highest score was found in learning quality (97.92%), showing that the application effectively supports instructional activities. The lower technical quality score (80%) suggests there is room for improvement in navigation or interface responsiveness. Overall, teachers found the application easy to use and suitable for classroom implementation.

Practitioner evaluate that KALISAD application has appearance simple and easy understood by students deaf. Navigation between menus are assessed Enough clear so that student can use application in a way independent with minimal direction from the teacher. Use visual images, icons and language videos gestures also help student understand content material as well as instructions exercise.

The KALISAD application demonstrated moderate improvement in structured sentence writing skills among participating deaf students and shows potential as a supportive learning medium. The application was perceived as practical and suitable for classroom implementation due to its ease of use, visual accessibility, and structured learning activities. However, further research involving larger samples and more rigorous experimental designs is required to confirm its effectiveness. In addition, the exercise compilation sentence level -based assessment effective Because help student Study in a way gradually start from pattern sentence simple SPO to SPOK. Score feature automatically on training also increases motivation Study student Because student can direct know results his job.

Effectiveness Product

Research result show improvement score compile sentence structured For all students, with average score increased from 59.5 (category low) to 81.75 (category good). The average N-Gain score was 0.57, which is categorized as as currently.

Table 6. Pretest and Posttest Scores

No	Student Name	Pretest	Posttest	N-Gain	Category
1	MI	60	82	0.55	Currently
2	AB	58	80	0.52	Currently
3	WS	65	85	0.57	Currently
4	SA	55	78	0.51	Currently
5	AE	75	98	0.92	Tall

6	AG	57	79	0.51	Currently
7	DC	52	75	0.48	Currently
8	MR	54	77	0.50	Currently
Average		59.5	81.75	0.57	Currently

Table 6 shows a substantial increase in student performance after using the KALISAD application. The average pretest score increased from 59.50 to 81.75 in the posttest, representing an improvement of 22.25 points. The average N-Gain score of 0.57 falls within the moderate improvement category, indicating that the application effectively improved structured sentence writing skills. Student AE achieved the highest improvement with an N-Gain of 0.92, suggesting that individual learning readiness may influence learning outcomes.

Implementation Learning with the KALISAD Model

Observation results implementation learning with the KALISAD model reaching 95.32% indicating results categorized as very good in results compile sentence structured for students deaf.

Table 7. Implementation Results Learning with the KALISAD Model

No	Aspect Evaluation	Percentage (%)
1	Measurability	87.5%
2	Compliance	100%
3	Clarity Indicator	87.5%
4	Systematic	100%
5	Implementation	87.5%
6	Predictability	100%
7	Practicality Use	100%
8	Completeness Aspect	100%
Average		95.32%

Table 7 indicates that the implementation of learning with the KALISAD model achieved an average score of 95.32%, categorized as very good. The perfect scores in suitability, systematic process, predictability, practical use, and completeness demonstrate that the application can be integrated smoothly into classroom learning. This result suggests that KALISAD supports structured and effective instructional delivery for deaf students.

Findings study This show that KALISAD application has potential in increase ability write structure sentences to students deaf. Improvement results learning gained student after use application show that learning media visual and interactive based capable help student understand pattern sentence with easier and more systematic. This in line with opinion Rohmah and Harsiwi (2024) stated that that utilization optimal technology can create environment more learning inclusive as well as help child deaf develop its potential in a way maximum.

Improvement ability write students can also explained through characteristics Study student deaf people who rely on visual ability compared Language Oral. According to Fadilah et al. (2025), oral skills write for student deaf own role important as means communication and expression language that replaces limitations access to Language oral. Therefore that, use KALISAD application that combines images, animated videos Language signals, as well as exercise interactive capable help student understand structure language and composition sentence with appropriate.

KALISAD application is designed with appropriate visual approach with need Study student deaf. Use visual features, exercises compile sentences and presentation systematic material

help student understand SPOK pattern. Findings This in accordance with Ramdan and Tati's research (2018) states that student deaf often experiencing difficulty in compile sentence according to grammar. With the existence of learning media interactive, students get visual aids that can make the process of understanding easier arrangement sentence in a way gradually.

In addition to improving understanding structure sentences, usage KALISAD application also improves motivation and engagement student during learning ongoing. Students seen more active and enthusiastic moment use application compared to learning conventional. This is in line with opinion Septiawati et al. (2021) who explained that application learning that combines interesting visuals can stimulate cognitive processes, help Power remember, and make it easier student in connect picture with words or meaning Language.

The N-Gain value is in the category currently show that KALISAD application is capable give improvement ability compile structure sentence, although improvement the Not yet maximum. Condition the can influenced by ability beginning different students, limitations vocabulary, as well as time use applications that are still limited during study ongoing. According to Arifin et al. (2021), skills write need structured and continuous practice to master grammar, vocabulary and structure sentence can develop optimally.

Research result This is also supported by research by Putri and Pangastuti (2025) which shows that ability academic, communicative, and social student deaf can increase through use of visual and interactive media in a way consistent. With Thus, the KALISAD application does not only functioning as a learning medium writing, but also as means supporters communication and development ability Language student deaf.

Although Thus, research This Still have limitations, such as amount subject limited research and time relative implementation short. Therefore that, research furthermore expected can develop feature more applications varied and do implementation in term more time length for effectiveness KALISAD application can known in a way more deep.

Conclusion

Based on results research and development KALISAD application which has done, can concluded that KALISAD application is worthy used as application For increase ability write structure sentences to students deaf. Validation results expert show that KALISAD application obtains very valid and fulfilling category aspect eligibility materials, media, and use in learning. In addition, the results observation implementation learning show that application can used with good and capable support the learning process in a way effective.

Research results also show existence improvement ability write structure sentence student deaf after use KALISAD application. Improvement the seen from results pretest and posttest as well as N -Gain value in the category moderate. This is show that KALISAD application is capable help student understand compilation structure sentence in a way more systematic through visual approach, language gestures, and appropriate interactive with characteristics Study student deaf.

Use visual features, exercises interactive, images, videos, and presentation simple and systematic material be one of supporting factors improvement motivation, attention, and involvement student during the learning process ongoing so that learning become more interesting and not monotonous.

Although Thus, research This Still own limitations, such as amount subject limited research and time relative implementation short. Therefore that, research furthermore expected can

develop feature more applications varied, involving subject further research wide, and do implementation in term more time length for effectiveness KALISAD application can known optimally.

Suggestion

Based on results research and development KALISAD application, then the suggestions that can be given is as following:

For Teachers

Teachers are expected can utilise KALISAD application as a learning medium alternative For help student deaf in understand structure sentence simple. Usage application visual based can increase engagement and motivation Study student during learning ongoing.

For Schools

School expected can support use of learning media based application with provide facility supporters such as smartphones, computers, or adequate internet network for learning can walk more optimal.

For Students Deaf

Student deaf expected can use KALISAD application in independent as a training medium For increase ability compile sentence simple SPO and SPOK patterned gradually.

For Researchers Furthermore

Researchers furthermore expected can develop KALISAD application with more features complete, such as addition animation interactive, games educational, training write paragraphs, and development material other Indonesian languages so that the application become more interesting and varied.

For Learning Media Developers

Learning media developer expected can Keep going develop appropriate digital- based media with characteristics student in need special, especially student deaf, with notice visual aspects, readability, ease of use usage, and interactivity learning.

References

- Alahmari, S. A., Aftab, M. J., & Amjad, F. (2025). Challenges in Literacy Skills Development in Early Childhood Special Education in Inclusive Setting. *American Journal of Psychiatric Rehabilitation*, 28(1), 661-671. <https://doi.org/10.69980/ajpr.v28i1.168>
- Arifin, Z., Setiawan, D., & Lestari, P. (2021). Improving students' writing skills through structured writing practice. *Journal of Language and Education Research*, 8 (2), 112–121.
- Bacacao, M. S. (2025). Learners' Competence in Sentence Construction: Basis for a Writing Skills Enhancement Program. *International Journal of English Language, Education and Literature Studies*, 4(6), 642826. <https://doi.org/10.22161/ijeel.4.6.12>
- Barianty, T. N., Suryati, N., Widiati, U., Dinata, R. P., & Wahyuningsih, S. (2025). Ten Years Evolving Writing Instruction Model for English Language Students with Learning Disabilities: A Systematic Literature Review. *Learning Disabilities: A Contemporary Journal*, 23(2), 175-200.

- Biermann, O. C., Ma, N. F., & Yoon, D. (2022, June). From tool to companion: Storywriters want AI writers to respect their personal values and writing strategies. In *Proceedings of the 2022 ACM Designing Interactive Systems Conference* (pp. 1209-1227). <https://doi.org/10.1145/3532106.3533506>
- Bukhari, S. U. P., Kalhor, I. A., Lashari, A. A., Soomro, I. A., Batool, S., & Amur, A. (2023). The communication barriers and their impacts on the academic performance of the graduate students. *Journal of Positive School Psychology*, 7(5), 605-612.
- Coppola, M., & Walker, K. (2025). Early language access and STEAM education: Keys to optimal outcomes for deaf and hard of hearing students. *Education Sciences*, 15(7), 915. <https://doi.org/10.3390/educsci15070915>
- Dewi, AC (2025). Teacher Strategies in Developing Writing Skills that Have a Positive Impact on the Literacy Development of Junior High School Students. *Journal of Educational Studies and Learning Horizons (JAKAP)*, 1 (3).
- Fadilah, N., Wagino, & Sujarwanto. (2025). Website Application Development to Improve Sentence Structure Writing Skills in Deaf Students in Special Needs Schools. *IQRO: Journal of Islamic Education*, 8 (1), 185–201. <https://doi.org/10.24256/iqro.v8i1.6770>
- Imaniah, I. (2022). A critical review of english essay writing in studies of critical thinking, reading habits, and sentence structure mastery. *Indonesian EFL Journal*, 8(1), 53-62. <https://doi.org/10.25134/ieflj.v8i1.5588>
- Jiang, Q., Horta, H., & Yuen, M. (2022). International medical students' perspectives on factors affecting their academic success in China: a qualitative study. *BMC Medical Education*, 22(1), 574. <https://doi.org/10.1186/s12909-022-03597-z>
- Kaliraj, P., & Devi, T. (Eds.). (2022). *Industry 4.0 technologies for education: Transformative technologies and applications*. CRC Press.
- Kamal, A. (2026). Mobile Learning Applications as Assistive Tools for Students with Special Educational Needs. *Accessibility Pathways: Inclusive Education for All*, 124.
- Katsarou, D. V., Efthymiou, E., Kougioumtzis, G. A., Sofologi, M., & Theodoratou, M. (2024). Identifying language development in children with ADHD: Differential challenges, interventions, and collaborative strategies. *Children*, 11(7), 841. <https://doi.org/10.3390/children11070841>
- Khasawneh, M. A. S. (2024). Teacher opinions on the role of educational robots in enhancing programming skills among hearing-impaired students. *International Journal of Learning, Teaching and Educational Research*, 23(5), 309-322. <https://doi.org/10.26803/ijlter.23.5.16>
- Khudaverdiyeva, T. (2025). The importance of writing in language acquisition: A cognitive, communicative, and pedagogical perspective. *Global Spectrum of Research and Humanities*, 2(3), 127-138. <https://doi.org/10.69760/gsrh.0203025014>
- Leotta, P. C., & Ahmad, M. (2025). Improving Writing Skills in Academic English Through Explicit Instruction and Process Writing. *International Journal of Linguistics*, 17(2), 80. <https://doi.org/10.5296/ijl.v17i2.22811>
- Llovido, J. L., Brogada, M. A. D., Relucio, F. S., Austero, L. D., Maceda, L. L., & Abisado, M. B. (2024, February). BOSESKO: Designing A Synoptic Multi-Platform Digital System for Citizen Participation. In *2024 26th International Conference on Advanced*

Communications Technology (ICACT) (pp. 1-8). IEEE.
<https://doi.org/10.23919/ICACT60172.2024.10472009>

- Mansutti, I., Achil, I., Rosa Gastaldo, C., Tomé Pires, C., & Palese, A. (2023). Individuals with hearing impairment/deafness during the COVID-19 pandemic: a rapid review on communication challenges and strategies. *Journal of Clinical Nursing*, 32(15-16), 4454-4472. <https://doi.org/10.1111/jocn.16572>
- Martens, S., Maes, L., Dhondt, C., Vanaudenaerde, S., Sucaet, M., De Leenheer, E., ... & Dhooge, I. (2023). Vestibular infant screening–Flanders: what is the most appropriate vestibular screening tool in hearing-impaired children?. *Ear and Hearing*, 44(2), 385-398. <https://doi.org/10.1097/aud.0000000000001290>
- Mueller-Roterberg, C. (2018). *Handbook of Design Thinking: Tips & Tools for how to design thinking*. Christian Mueller-Roterberg.
- Naini, I., & Ulya, R. H. (2025). Reasoning patterns and sentence construction errors in students' scholarly articles: A content analysis of academic writing in Padang City. *Al-Ishlah: Jurnal Pendidikan*, 17(2), 2786-2796. <https://doi.org/10.35445/alishlah.v17i2.7447>
- Nair, M. K. C., Radhakrishnan, R., & Olusanya, B. O. (2023). Promoting school readiness in children with developmental disabilities in LMICs. *Frontiers in Public Health*, 11, 993642. <https://doi.org/10.3389/fpubh.2023.993642>
- Nugrahani, F., Septiari, W. D., & Widayati, M. (2025). Literacy in Reading and Writing: Systematic Literature Review. *Journal Edunity*, 4(11). <https://doi.org/10.57096/edunity.v4i11.456>
- Nurapriani, R., & Darmawan, D. (2025). Chat-GPT Integration in Task-Based Language Teaching to Improve Opinion, Reasoning, and Information Gaps in English Language Learning to Improve Speaking Skills. *JPI (Jurnal Pendidikan Indonesia)*, 14(3), 669-678. <https://doi.org/10.23887/jpi-undiksha.v14i3.93171>
- Potier, K. R., & Givens, H. (2023). Synthesizing Vygotsky's sociocultural theory and deaf pedagogy framework toward deaf education reform: Perspectives from teachers of the deaf. *American Annals of the Deaf*, 168(1), 102-127. <https://doi.org/10.1353/aad.2023.a904169>
- Putri, NF, & Pangastuti, R. (2025). The Role of Early Intervention and Consistent Stimulation in Supporting the Development of Deaf Children. *IHSAN Journal: Journal of Islamic Education*, 3 (3), 567–572. <https://doi.org/10.61104/ihsan.v3i3.1404>
- Ramdan, H., & Tati, H. (2018). Improving the Ability to Construct Spoken Sentences Through Word and Picture Cards. *Jassi-Anakku*, 18 (2), 59–65. <https://doi.org/https://doi.org/10.17509/jassi.v18i2.15448>
- Ramzan, M., Javaid, Z. K., & Ali, A. A. (2023). Perception of students about collaborative strategies employed by teachers for enhancing English vocabulary and learning motivation. *Pakistan Journal of Law, Analysis and Wisdom*, 2(02), 146-158.
- Rohmah, M., & Harsiwi, NE (2024). Utilization of Technology and Assistive Devices to Improve Learning for Deaf Children at Bugih Pamekasan State Special Needs School. *Journal of Creative Student Research*, 2 (3), 307–313. <https://doi.org/10.55606/jcsr-politama.v2i3.3935>

- Saaty, A. A. (2023). Correlations between expressing feelings, conveying thoughts, and gaining confidence when writing personal narratives in one's first and second language. *World Journal of English Language*, 13(1).
- Sabilla, A. N., & Kaniadewi, N. (2025). Investigating English-speaking problems of senior high school students in Indonesia: investigating English-speaking problems of senior high school students in Indonesia. *SALEE: Study of Applied Linguistics and English Education*, 6(1), 88-107. <https://doi.org/10.35961/salee.v6i1.1617>
- Safitri, MH, Syofyan, H., & Yolanda, N. (2022). Writing Skills of Deaf Children at Elementary School Level (SD) at Kasih Bunda Special Needs School/BC. *National Seminar on Educational Sciences and Multidisciplinary Studies*, 5 (1).
- Sahnan, B., & Daulay, S. H. (2025). Developing Students' Vocabulary by Using Build-A-Sentence: Teachers' Perspective. *Scope: Journal of English Language Teaching*, 9(2), 692-698. <https://doi.org/10.30998/scope.v9i2.22547>
- Secora, K., Wolbers, K., & Dostal, H. (2023). Writing instruction as an authentic context for targeting speech and language therapy goals for deaf and hard of hearing children. *Perspectives of the ASHA Special Interest Groups*, 8(1), 73-87. https://doi.org/10.1044/2022_PERSP-22-00168
- Septiawati, D., Suryani, N., & Widyastono, H. (2021). Analysis of Learning Media Needs for Vocabulary for Deaf Children in Special Schools. *International Journal of Multicultural and Multireligious Understanding*, 8 (9), 512-515. <https://doi.org/http://dx.doi.org/10.18415/ijmmu.v8i9.3438>
- Singun, A. J. (2025). Unveiling the barriers to digital transformation in higher education institutions: a systematic literature review. *Discover Education*, 4(1), 37. <https://doi.org/10.1007/s44217-025-00430-9>
- Siregar, R. S. (2025). Improving the Arabic Writing Skills of Students through the Application of Contextual Learning Methods at Dayah Irsyadul Abidin Qurani. *Indonesian Journal of Education and Social Humanities*, 2(1), 358-369. <https://doi.org/10.62945/ijesh.v2i1.726>
- Spatioti, A.G., Kazanidis, I., & Pange, J. (2022). A Comparative Study of the ADDIE Instructional Design Model in Distance Education. *Information*, 13 (9), 402. <https://doi.org/10.3390/info13090402>
- Sriwidiastuty, A., Sarwi, Sudarmin, & Nurcahyono, A. (2024). Optimizing Narrative Writing Learning Through Communicative Media for Students with Special Needs and Hearing Impairments. *Pelita PAUD Journal*, 9 (1), 245-254. <https://doi.org/10.33222/pelitapaud.v9i1.4405>
- Sugiyono. (2008). *Qualitative Quantitative Research Methods and R&D* (Vol. 25). CV. Alfabeta
- Tacda, C. J. C., Fontanilla, P. M., Viña, C. J. A. D., Patawaran, A. R. C., Gono, S. C., & Pocaan, A. P. D. A. (2025). A Cross-Platform Educational Mobile Application with Dynamic Content Management: Development and Evaluation of LAYAG. *International Journal in Information Technology in Governance, Education and Business*, 7(1), 116-134. <https://doi.org/10.32664/ijitgeb.v7i1.185>
- Teng, M. F., & Yue, M. (2023). Metacognitive writing strategies, critical thinking skills, and academic writing performance: A structural equation modeling

approach. *Metacognition and Learning*, 18(1), 237-260.
<https://doi.org/10.1007/s11409-022-09328-5>

Utegenova, K. T., & Berkina, S. S. (2023). Development of writing skills as a component of functional literacy. *Вестник ЗКУ*, 4, 92. [https://doi.org/10.37238/1680-0761.2023.92\(4\).76](https://doi.org/10.37238/1680-0761.2023.92(4).76)

Vicente-Yagüe Jara, M. I. D., García Guirao, P., Jiménez-Pérez, E. D. P., & López Martínez, O. (2023). Reading and writing skills: cognitive, emotional, creative, and digital approaches. *Frontiers in Psychology*, 14, 1279276.
<https://doi.org/10.3389/fpsyg.2023.1279276>