

EXPLORING VISUALLY IMPAIRED STUDENTS' EXPERIENCES WITH NVDA IN LEARNING ENGLISH: A CASE STUDY IN INCLUSIVE EDUCATION

Lintang Kusumaningtyas^{1*}, Pryla Rochmahwati²

^{1,2} UIN Kiai Ageng Muhammad Besari, Ponorogo, Indonesia

lintangkusumacepu@gmail.com

ABSTRACT

This study aimed to examine the experiences of visually impaired students in utilizing Non-Visual Desktop Access (NVDA) as a medium for English language learning in an inclusive classroom at SMA Muhammadiyah 1 Ponorogo, Indonesia. This research used a qualitative method with a case study approach. Three visually impaired students were sampled for the study. Data collection was conducted through an interview and observation method. The data was analyzed qualitatively with the help of thematic analysis. The research was also guided by the Technology Acceptance Model and the Constructivist Learning Theory. The study found that NVDA is an effective medium for English language learning for visually impaired students. It helps the students access English language texts easily. NVDA also helps the students to be independent and build confidence in completing English language learning tasks. However, the research also found that NVDA has some limitations. It cannot handle non-text and multimodal content such as images, tables, graphs, and visually dense presentation materials. The research concluded that NVDA is not only an assistive technology but also a pedagogical support for English language learners.

Keywords: Inclusive Class, NVDA, Student Experiences

INTRODUCTION

Education is mandatory for all children in Indonesia, including those with disabilities. Inclusive education is defined as an educational program that accommodates all students in the same class, with challenging, feasible challenges, but in accordance with the needs of students, where each child is accepted as a member of society, so that the child achieves success and meets their needs (Utari, 2023). Through the policy of the Minister of National Education, Number 70 of 2009, inclusive education provides opportunities for all students with disabilities, together with the educational environment with non-disabled students (Kasman, 2020). Thus, inclusive education allows children with special needs to get an education that is equal to that of other children.

Among the diverse group of children with special needs is a range from blind, deaf, learning difficulties, cerebral palsy, autism, gifted children, ADHD, and learning disabilities to those with visual impairments (Mardiansah Mardiansah et al., 2024). One group of

children with special needs who need special attention in the learning process is those with visual impairments (Djari, 2025). One of the schools that implements inclusive education is SMA Muhammadiyyah 1 Ponorogo. With existing limitations, they need to adjust the media and learning environment in order to be able to follow the lessons optimally. Learning media are understood as the channel through which educational content is delivered (Romadiah et al., 2022), plays a essential role in facilitating effective and efficient language instruction. In learning English, media is expected to make a more effective and efficient learning process in accordance with the learning (Puspitarini, 2019). Through tailored procedures and support from an adequate school environment, inclusion students can learn English vocabulary, grammar, and pronunciation just like other non-inclusion students (Seechaliao, 2024). This kind of learning also helps them develop confidence and independence and opens doors to accessing the world's information and advancing their education to a higher level (Fahkrunisa et al., 2023)

In response to this challenge, assistive technology has emerged as a critical tool in inclusive education, especially for the visually impaired. This is evidenced by the existence of a technology called Non-Visual Desktop Access (NVDA) as a learning medium that contributes positively to the learning process of the visually impaired. Non-Visual Desktop Access (NVDA) is a free, open-source, portable screen reader for easy operation of computers or Microsoft Windows (Lutfio et al., 2023). NVDA technology can be categorized as a technology-based audio and digital media (Pribadi, 2017). As stated by Fred Davis in the Technology Acceptance Model (TAM), the acceptance of technology is influenced by the perception of ease of use (perceived ease of use) and its benefits (perceived usefulness) (Wicaksono, 2022). In the EFL context, students' engagement with NVDA offers valuable insights into how assistive technologies are evaluated not only as functional tools but also as enablers of linguistic and cognitive development. This perspective aligns with constructivist learning theory, which posits that learners actively construct knowledge through authentic, experiential interaction with their environment (Schunk, 2012). Therefore, students' use of NVDA to navigate English materials represents a dynamic process of meaning-making and skill-building.

Previous studies affirm that NVDA technology significantly enhances the learning experience for visually impaired students by facilitating access to information, promoting autonomy, and enabling effective communication in inclusive educational settings, ultimately supporting their academic and personal development (Carabalí-Mendez & Mendoza-Moreira, 2021). Others state that the use of laptop-based NVDA can improve cognitive learning outcomes as well as the independence of visually impaired students in carrying out lecture assignments, especially in the operation and creation of documents in Microsoft Office (Ariyanto et al., 2022). Another study also states that NVDA has an

important role in learning because it is free compared to other screen reader applications (Azzahra et al., 2024).

Despite these findings, there is a significant gap. Limited studies have specifically examined how students with visual impairments experience NVDA as a medium for learning English as a foreign language within inclusive secondary classrooms. Understanding these lived experiences is essential for designing pedagogically sound, accessible EFL instruction that leverages technology effectively.

Therefore, this study aims to find out how the technology is implemented and how the experience of blind students using NVDA technology as an English learning tool is in inclusive classrooms. The results of this study are expected to provide an in-depth understanding of the use of NVDA technology in supporting visually impaired students in learning in inclusive classrooms, as well as guide teachers during the development and adjustment of learning methods and media in a more accessible way. In addition, the results of this research are also expected to be a demonstration and example for other educational centers in creating more inclusive learning and making the best use of technology. The research questions are as follows:

1. How is the implementation of NVDA technology in supporting English learning for visually impaired students in inclusion classes?
2. How are visually impaired students' experiences in using NVDA technology as an English language learning medium in inclusion classes?

METHODS

This study uses a qualitative descriptive approach to find out how visually impaired students experience the use of NVDA as an English learning medium in inclusive classes. This qualitative approach is considered more appropriate because it captures the essence of the meaning of the participant's experience in the context of natural learning. A qualitative approach is used when researchers want to understand phenomena based on the perspective of participants and explore the meaning of their experiences in a particular social and cultural context (Creswell, 2014). The research design of the case study used in this study aims to explore complex phenomena in real contexts. The case analyst seeks to see as much information as possible with respect to the subject under consideration (Salsabila et al., 2025.).

In this study, the researcher used a purposive sampling technique. Purposive sampling is a technique for sampling data sources with certain considerations. This consideration aims to obtain broad, detailed, and in-depth data or information so that a meaningful and comprehensive truth is obtained. For example, assigning someone as a sample who is considered to have extensive knowledge of the information expected by the researcher (Sinaga, 2023). In this study, the participants in the sampling consisted of 3 visually impaired male students, two of whom were 10th-grade students, and one 11th-grade student who signed the participant consent. This technique allows researchers to explore in depth the

experiences of visually impaired students in the use of NVDA as a medium of learning English in the classroom.

Data was collected through observation and interviews. Observations were used to find out how NVDA was implemented in the inclusion class and to make additional notes to support the data collection. In this study, observations were carried out in a month, which focused on how to implement NVDA in the classroom, interaction between students, and how to deliver material in an inclusive classroom. Semi-structured interviews allow flexibility in the exploration of how blind students experience using NVDA technology in the English language learning process (Waruwu, 2023). The interview instrument in this study examines how students experience using NVDA, which includes aspects of convenience, benefits, obstacles faced, and its impact on understanding English learning materials. This instrument is compiled based on relevant theories that are in accordance with predetermined research questions.

Once the data is collected, the next step is to analyze the data. In this study, the researcher used a thematic data analysis technique encompassing familiarizing data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report (Braun & Clarke, 2006). This approach allows researchers to find patterns and meanings at a constant rate in qualitative data. Through thematic analysis, researchers can raise very important issues related to the participants' experiences. This approach allows for simpler interpretations of complex narratives with conclusions that reflect the actual research situation. The researcher conducts four steps to ensure validity or trustworthiness, namely credibility, transferability, dependability, and confirmability (Mekarisce, 2020).

RESULTS

The Implementation of NVDA Technology in Supporting English Learning for Visually Impaired Students

Table 1. Summary of learning aspect implementation based on observation

No.	Observed Aspects	Yes	No	Notes
1.	Use NVDA in the class	✓		Use a personal pc at a certain time.
2.	School facilitates NVDA	✓		Provided in a dedicated room.
3.	Use NVDA during assignments	✓		Used well during school exams.
4.	Teacher mentoring	✓		Help students when they are struggling.
5.	Good interaction	✓		Good interaction with classmates.
6.	Provide different material		✓	Teaching materials and books are the same for students without disabilities.

7. Assessment adjustment	✓	The assessment format is in the form of a word file.
8. Confidence	✓	More confidence when using NVDA

This observation table shows that students use NVDA in classroom learning well. In this case, the school facilitates NVDA-installed computers, which can be used by students as needed. NVDA can function well when used to complete assignments and understand English material. In its implementation, teachers also provide maximum support and assistance when students experience difficulties, such as obstacles in describing pictures, tables, and graphs. In addition, students also interact well with classmates.

In terms of learning materials, teachers do not distinguish or specifically design the materials provided between students with special needs and those without, in the sense that all the materials that students receive in this inclusion class are equal. However, in terms of assessment, teachers still adjust to the needs of visually impaired students, both from the assessment format and the grade criteria that are in accordance with the student's ability, with the material notes contained in it remaining the same. The use of NVDA has a positive impact on student confidence, as with this technology, students can learn independently and show more confidence in learning English.

Visually Impaired Students' Experiences in Using NVDA Technology as an English Language Learning Medium in Inclusive Classes

Ease & Sustainability of NVDA Use

The results of the interviews show that students have been using this NVDA since the level before high school. Students say that they can use the technology independently without the help of others.

"I have been using NVDA since elementary school, using a computer provided by the school, and I can operate it independently without the help of others" (R1)

"I have been using NVDA since 2017, using a personal laptop and a computer provided by the school. I can easily use this NVDA independently" (R2)

"I have been using NVDA since junior high school, and have been able to operate it independently" (R3)

Based on interviews, it shows that all respondents have known and used NVDA before entering high school, starting from elementary school to junior high school. The long enough use makes them accustomed to using the technology both on personal devices and computers, making it easier in the learning process. Students also revealed that they can operate NVDA independently without the help of others while learning both outside and in class. They revealed that this technology is easy to use and has become part of their daily learning activities.

NVDA as an Assistive Technology Supporting Accessible and Independent Learning

Visually impaired students use NVDA as a medium to learn and find additional materials on the internet.

"NVDA is very helpful in understanding learning materials, in everyday use for searching materials" (R1)

"NVDA helps in the learning process" (R2)

"This technology helps me in understanding the learning materials and finding additional materials through the internet" (R3)

Respondents revealed that this technology is used as a learning medium to access learning materials and find additional materials from other sources, namely the internet. This will help students understand the material optimally. The existence of NVDA also makes it easier for the visually impaired in learning activities, both in the classroom and outside. With the support of this NVDA, students can access learning materials more effectively and continuously in their daily learning activities.

Institutional and Social Support in Facilitating Effective NVDA Use

In addition, students emphasize that the institution and teachers also play a very important role in the implementation of NVDA. Every student feels that it is difficult, but the teacher always explains step by step, according to the obstacles faced by students.

"The school supports by providing computer facilities that are installed with NVDA. In addition, teachers and friends also help many times when they have difficulties, such as describing drawing materials and tables, and when there is a problem with the pc" (R1)

"The school facilitates well, and the teacher always explains slowly when difficulties arise" (R2)

"The facilities provided by the school are in the form of NVDA-installed computers that can function properly. In addition, teachers and friends are also very supportive because they help when facing obstacles in learning" (R3)

Respondents said that environmental support plays a very important role in supporting the implementation of inclusive learning. The environmental support includes the role of schools, teachers, and peers. Schools play a role in providing facilities in the form of computers that have been installed with NVDA that can be used by students as needed. On the other hand, teachers provide full support and assistance to visually impaired students when they face difficulties in defending while using NVDA in the learning process. In addition, interaction with peers also helps blind students overcome obstacles that arise while studying. This supportive environment helps students to be more comfortable in participating in classroom learning.

Perceived Efficiency and Usability of NVDA in Supporting Language Learning

In addition, students revealed that the use of NVDA is more efficient compared to other devices that have a computer or laptop because it is easier to operate and the sound produced is clearer.

"It's not too confusing when I start using it, because NVDA is easy to operate and NVDA helps you understand vocabulary by spelling it word-by-word" (R1)

"At first I was a bit confused because I was not familiar, but after a while I got used to it because it was more efficient than the built-in screen reader application of the laptop, because the sound produced was clearer and there was a choice of sounds" (R2)

"At first confused because I was not used to it, NVDA helped me learn to read English and pronunciation by spelling per character" (R3)

The results of these findings show that the use of NVDA provides positive cognitive and emotional experiences for visually impaired students in learning English. Although they experienced some difficulties when they first started using it, over time they began to get used to it and found this NVDA easier to operate than the laptop's built-in application. In learning English, they say that when they want to understand vocabulary and readability, they will direct the cursor to read the writing of the characters so that they also know the writing and how to pronounce it.

Technical and Content-Related Limitations of NVDA in Multimodal Learning Materials

Students also revealed that they faced several challenges in using NVDA. Students also said that they still have difficulties when there are pictures and reading text on tables and graphs.

"Sometimes I get an error on my laptop, but this is also very rare" (R1)

"When using NVDA, the laptop sometimes freezes and can't read the graphs" (R2)

"NVDA cannot read images, specific tables, and PPTs that have too many images or elements" (R3)

This makes students sometimes need the help of others to help describe or explain the material and assignments in the form of pictures, tables, or graphs. In addition, students revealed that sometimes they also face problems with their PCs such as laptops or computers that are sometimes slow or freeze, which causes learning to be hampered. However, these obstacles are very rarely faced, so overall, students say that NVDA is very helpful in the English learning process in the classroom. This is supported by the recognition by English subject teachers who make direct observations of students in the form of comprehension tests, such as speaking tests, which show that students can follow learning well and can adjust to students who are not included.

DISCUSSION

The findings of the study show that students use NVDA technology as a learning medium in the classroom, and schools also facilitate computers installed with NVDA to meet students' learning needs. This institutional readiness reflects a broader commitment to inclusive education by creating an adaptive and disability-friendly learning environment. However, while the availability of assistive technology indicates structural preparedness, inclusion should not be understood merely as the provision of facilities. Rather, it requires sustained pedagogical, technical, and social support to ensure meaningful access to learning. This finding supports previous research emphasizing that inclusive education demands careful planning and responsiveness to diverse learner needs (Dewi, 2024). As well as other research that states Access to facilities and infrastructure will determine the quality of inclusive education (Amaliani et al., 2024).

Beyond institutional provision, NVDA is used by blind students to understand and complete the assignments of the teacher. In this case, the teacher prepares several materials and assignments in the form of soft files that can later be read by NVDA. Previous research has shown that NVDA has also become an excellent tool for reading text files such as PDFs and others, with excellent sound modulation according to user preferences (Nur'aisah et al., 2022). From a theoretical perspective, this finding resonates with the Technology Acceptance Model, which posits that the acceptance of technology is influenced by the perception of ease of use and its benefits (Wicaksono, 2022). Students' continued reliance on NVDA suggests that the technology meets both functional and pedagogical expectations in the learning process.

Importantly, the implementation of NVDA does not operate in isolation but is embedded within a supportive social environment. Teachers and peers also have an important role in implementing this NVDA. This teacher assistance will make it easier for students to face obstacles such as describing material in the form of pictures, graphs, and tables. In the classroom, students also interact regularly with their classmates, which shows that an inclusive classroom environment has supported social interaction and cooperation between students. These interactions not only foster language skills but also self-reliance and efficacy, enhancing the overall learning experience in an inclusive class (Grusec, Joan, 2025). Also, it reinforces findings from socio-cultural perspectives that cognitive development is shaped by social interaction and community participation (Kurniawan et al., 2023).

In addition, in terms of providing materials, there is no difference between students with special needs and those who do not, namely, all students get the same and equal learning materials. This is in line with previous research that stated that all students,

including those with special needs, have the same opportunity to access learning materials. (Choi & Seo, 2024). However, in terms of evaluation or assessment, blind students will be adjusted to their needs, such as exam formats and assessment criteria. This is in accordance with the Assessment for Learning (AfL) value, which emphasizes the importance of formative assessments that are in accordance with the entire learning process and are adjusted to the unique characteristics of each student (Popham, 2020). The use of NVDA not only supports students' cognitive development but also increases students' independence and confidence in learning English in the classroom.

Furthermore, NVDA supports students' learning both inside and outside the classroom, enabling independent access to learning materials, task completion, and online resources. Students revealed that NVDA is more efficient to use than the built-in laptop application, because it is easy to operate and the sound produced is clearer, thus helping them easily learn English, such as understanding vocabulary and pronunciation. This is in line with previous findings that NVDA technology can help blind students in independent learning and easily access distance learning materials (Inayah & Prasetyo, 2025).

From a cognitive and affective perspective, students initially felt confused when they first used NVDA because they were not used to it. But over time, students become accustomed to it and judge that NVDA is more efficient than computer-built screen reader applications, because the sound produced is clearer and can be adjusted to user preferences (Dewi, 2024). The per-character reading feature on NVDA helps students understand the spelling and pronunciation of English vocabulary at the same time. This contributes to students' cognitive processes in recognizing word structures and improving pronunciation skills. Such learning processes align with the theory of constructivism, which views knowledge as actively built by students through direct experience and reflection on the real world (Schunk, 2012).

Despite these benefits, students also reported persistent challenges in using NVDA, particularly its inability to adequately describe images, graphs, complex tables, and visually dense PowerPoint presentations. In addition, infrequent technical issues, such as system errors or device freezing, further complicate its use, although these occur. These limitations echo previous findings that NVDA still has limitations in describing images and images on the internet (Putra et al., 2021). Nevertheless, NVDA remains an efficient screen reader tool for both teachers and students with disabilities in the learning process (Nurhikmah & Awalya, 2021). Therefore, this study underscores that successful inclusive education emerges from the dynamic interplay between assistive technology, pedagogical adaptation, institutional support, and social collaboration.

CONCLUSION

The conclusions drawn from the findings of the study show that NVDA technology is proven to provide a meaningful learning experience for visually impaired students in English language learning in inclusive classrooms. Its use fosters learner autonomy, active engagement, and increased confidence, underscoring the critical role of assistive technology in supporting equitable and sustainable inclusive education. Importantly, the findings demonstrate that the effectiveness of NVDA is maximized when it is embedded within a supportive institutional environment and complemented by adaptive teaching practices and peer support.

Despite these positive outcomes, this study has several limitations, namely the limited number of participants and the fact that it was conducted in one inclusive school so that the results cannot be generalized to all visually impaired students in different educational contexts. In addition, this study is qualitative, so the effect of the use of NVDA on learning outcomes cannot be measured statistically, and the relatively short research period also prevents the use of NVDA in the long term from being observed comprehensively.

Future research is recommended to comprise larger and more varied samples across different educational settings and to adopt mixed-methods or longitudinal designs. Such approaches would allow for a more comprehensive examination of the long-term effects of NVDA on language learning outcomes, learner independence, and inclusive classroom practices.

ACKNOWLEDGMENT

All praise be to Allah SWT, who has given grace so that this research can be completed properly. The author would like to express his deepest gratitude to his family, friends, and supervisors who have provided support, encouragement, and guidance during the research process. The author also expressed his appreciation to all participants who were willing to take the time and contribute to this research. Hopefully, this research can provide benefits for readers and those in need.

REFERENCES

Amaliani, R., Yunitasari, S. E., Fajriah, D., & Gustini, E. (2024). *Sarana Dan Prasarana Sekolah Inklusi "Kunci Sukses Pendidikan Inklusi "*. 10.

Ariyanto, D., Pertiwi, E. P., Zamzami, M. H. A., & Hermawan, A. (2022). Pengaruh Aplikasi NVDA Terhadap Hasil Belajar Mahasiswa Tunanetra Universitas PGRI Argopuro Jember. *Education Journal: Journal Educational Research and Development*, 6(2), 170–176. <Https://Doi.Org/10.31537/Ej.V6i2.742>

Azzahra, A. H., Safitri, D., & Sujarwo, S. (2024). Peran Teknologi Non-Visual Desktop Access (NVDA) Untuk Siswa Tunanetra Dalam Proses Pembelajaran. *Jurnal Teknologi Pendidikan*, 1(4), 7. <Https://Doi.Org/10.47134/Jtp.V1i4.606>

Braun, V., & Clarke, V. (2006). Using Thematic Analysis in Psychology. *Qualitative Research In Psychology*, 3(2), 77–101. <Https://Doi.Org/10.1191/1478088706qp063oa>

Carabalí-Mendez, A., & Mendoza-Moreira, F. (2021). Non-Visual Desktop Access (NVDA) En La Formación De Postgrado De Una Persona No Vidente.: Autobiografía. *593 Digital Publisher CEIT*, 6(2-1), 53–62. <Https://Doi.Org/10.33386/593dp.2021.2-1.460>

Choi, G. W., & Seo, J. (2024). Accessibility, Usability, And Universal Design For Learning: Discussion Of Three Key LX/UX Elements For Inclusive Learning Design. *Techtrends*, 68(5), 936–945. <Https://Doi.Org/10.1007/S11528-024-00987-6>

Creswell, J. W. (2014). *Educational Research: Planning, Conducting And Evaluating Quantitative And Qualitative Research* (Pearson New International Edition, Fourth Edition). Pearson.

Dewi, W. P. (2024). Implementasi Pendidikan Inklusif Pada Sekolah Penyelenggara Pendidikan Inklusif Jenjang SMP Di Kota Tangerang. *Journal Of Education Research*, 5(1), 643–650.

Djari, T. R. W. (2025). Penerapan NVDA Berbasis Metode SAS Dalam Meningkatkan Kemampuan Membaca Permulaan Braille Bagi Anak Tunanetra Di SLB Negeri 01 Bantul. *Literal: Disability Studies Journal*, 3(01), 12–26. <Https://Doi.Org/10.62385/Literal.V3i01.161>

Dr. Benny A. Pribadi, M.A. (2017). *Media_Dan_Teknologi_Dalam_Pembelajaran_E*. PRENADAMEDIA GROUP.

Fahkrunisa, L., Warrahmah, M., Maharani, S., & Hanjarwati, A. (2023). Pengenalan Pentingnya Berbahasa Inggris Pada Anak Tunanetra Di Sekolah Luar Biasa. *Journal Of Disability Studies And Research (JDSR)*, 2(2), 12–23.

Grusec, Joan. (2025). Social Learning Theory and Developmental Psychology: The Legacies Of Robert Sears and Albert Bandura. *Researchgate*. Https://Www.Researchgate.Net/Publication/232605924_Social_Learning_Theory_And_Developmental_Psychology_The_Legacies_Of_Robert_Sears_And_Albert_Bandura

Inayah, Y., & Prasetyo, T. (2025). Meningkatkan Kualitas Belajar Melalui Teknologi Sebagai Media Pembelajaran Untuk Anak Yang Berkebutuhan Khusus. *Mudir: Jurnal Manajemen Pendidikan*, 7(1), 67–75. <Https://Doi.Org/10.55352/Mudir.V7i1.1512>

Kasman. (2020). Pendidikan Inklusif Bagi Anak Berkebutuhan Khusus. *Jurnal Education And Development*, 8.

Kurniawan, M. R., Mustakim, I., Harto, K., & Suryana, E. (2023). Analisis Kritis Teori Belajar Sosiolultural Terhadap Karakter Sosial Komunikatif Siswa Di Era Digitalisasi. *Jurnal Ilmiah Mandala Education (JIME)*, Vol 9. <Https://Doi.Org/10.58258/Jime.V9i1.5491> <Http://Ejournal.Mandalanursa.Org/Index.Php/JIME>

Lutfio, M. I., Kapitang, F., Wijaya, M. I., Azizah, Y. L., & Husna, D. (2023). Penggunaan Teknologi Sebagai Media Pembelajaran Pada Anak Berkebutuhan Khusus. *Jurnal Pendidikan*, 32(1), 121–128. <Https://Doi.Org/10.32585/Jp.V32i1.3489>

Mardiansah Mardiansah, Rizki Alvi Ramadhan, & Reni Suryani. (2024). Mengenal Anak Berkebutuhan Khusus Dan Klasifikasinya. *Ta'rim: Jurnal Pendidikan Dan Anak Usia Dini*, 5(1), 164–170. <Https://Doi.Org/10.59059/Tarim.V5i1.1013>

Mekarisce, A. A. (2020). Teknik Pemeriksaan Keabsahan Data Pada Penelitian Kualitatif Di Bidang Kesehatan Masyarakat. *Jurnal Ilmiah Kesehatan Masyarakat: Media Komunikasi Komunitas Kesehatan Masyarakat*, 12(3), 145–151. <Https://Doi.Org/10.52022/Jikm.V12i3.102>

Nur'aisah, E., Halawati, F., & Destiyanti, I. C. (2022). Pengembangan Teknologi Pembelajaran Tunanetra (Teptun) Berbasis Screen Reader NVDA Pada Mahasiswa Tunanetra. *Jurnal Pendidikan Dan Konseling*, 4.

Nurhikmah, N., & Awalya, A. (2021). Pengembangan Pembelajaran Anak Penyandang Tunanetra Dengan Menggunakan Pembaca Layar NVDA Di Masa Pandemi Di SLB Al Imam Luwu. *Jurnal Literasi Digital*, 1(3), 186–191. <Https://Doi.Org/10.54065/Jld.1.3.2021.62>

Popham, W. J. (2020). *Classroom Assessment What Teachers Need to Know* (9 Edition).

Puspitarini, Y. D. (2019). Using Learning Media to Increase Learning Motivation In Elementary School. *Anatolian Journal of Education*, 4(2), 53–60. <Https://Doi.Org/10.29333/Aje.2019.426a>

Putra, D. F., Sos, S., Si, M., Paff, M., Widodo, N., Ap, S., & Ap, M. (2021). Analisis Atas Pemaknaan Mahasiswa Tunanetra Dalam Penggunaan Screen Reader Pada Pemenuhan Kebutuhan Informasi Di Universitas Brawijaya.

Romadiah, H., Dayurni, P., & Fajari, L. E. W. (2022). Meta-Analysis Study: The Effect Of Android-Based Learning Media On Student Learning Outcomes. *International Journal of Asian Education*, 3(4), 253–263. <Https://Doi.Org/10.46966/Ijae.V3i4.300>

Salsabila, I., Meiliani, D., Maharani, S., & Lubis, R. N. (N.D.). Desain Penelitian Studi Kasus. 2025.

Schunk, D. H. (2012). *Learning Theories: An Educational Perspective* (6th Ed). Pearson.

Seechaliao, T. (2024). Instructional Strategies to Produce Educational Media Systematically. *Journal of Education And Learning*, 13(4), 121. <Https://Doi.Org/10.5539/Jel.V13n4p121>

Utari, N. K. S. E. (2023). Penerapan Disiplin Positif Melalui Kesepakatan Kelas Untuk Meningkatkan Disiplin Belajar Pada Siswa Tunagrahita. *Jurnal Pendidikan Inklusi Citra Bakti*, 1(1), 11–19. <Https://Doi.Org/10.38048/Jpicb.V1i1.2101>

Waruwu, M. (2023). Pendekatan Penelitian Pendidikan: Metode Penelitian Kualitatif, Metode Penelitian Kuantitatif Dan Metode Penelitian Kombinasi. *Jurnal Pendidikan Tambusai*, 7, 2896–2910.

Wicaksono, S. R. (2022). *Teori Dasar Technology Acceptance Model*. Zenodo. <Https://Doi.Org/10.5281/ZENODO.7754254>