

A Systematic Literature Review on Accessible Video-Based Modular Learning in Vocational Education for Deaf and Hard of Hearing (DHH) Students

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ARTICLE INFO	ABSTRACT
Article history Received April 23, 2026 Revised May 15, 2026 Accepted June 19, 2026	This study aims to systematically examine the implementation of <i>accessible video-based modular learning</i> in vocational education for students with hearing disabilities. The approach used is <i>Systematic Literature Review</i> (SLR) with reference to the PRISMA framework. The literature search process was carried out through the Scopus database with a publication time range of 2015-2025, resulting in 175 initial articles which were then selected until 12 articles that met the inclusion criteria were obtained. The analysis was carried out through the synthesis of thematic narratives on study characteristics, accessibility features, and learning effectiveness. The results of the study show that video-based learning combined with a modular structure has high effectiveness in improving concept understanding, vocational skills, and learning independence of students with hearing disabilities. Accessibility features such as <i>closed captions</i>, sign language, and visual support have proven to be key components in creating inclusive learning. In addition, the integration of innovative technologies such as Augmented Reality (AR), Virtual Reality (VR), and artificial intelligence (AI) makes a significant contribution to improving interactivity and learning experiences. However, implementation still faces various challenges, such as limited educator competencies, lack of accessibility-based learning design, and lack of institutional support. Therefore, a holistic approach that integrates pedagogical, technological, and policy aspects is needed to realize an inclusive and sustainable vocational learning system for students with hearing disabilities.
Keywords Video-based learning Modular learning Accessibility Vocational education Students with hearing disabilities Inclusive learning technology	

I. Introduction

Vocational education has a strategic role in preparing competent and job-ready human resources through the mastery of practical skills that are relevant to the needs of the industry (Muharam et al., 2025). However, access to inclusive vocational education remains a significant challenge, especially for students with disabilities, including Deaf and Hard of Hearing (DHH) students (Mapungwana et al., 2025). Audio-based communication barriers and limited access to verbal information cause deaf students to face difficulties in understanding the learning materials delivered conventionally (Karatsiori et al., 2025). This condition shows that there is a gap between the learning needs of Deaf and Hard of Hearing (DHH) students and the learning practices available today.

Along with the development of digital technology, video-based learning media is one of the potential innovative solutions in increasing learning accessibility. Video allows the presentation of information in a multimodal manner through the integration of text, images, animations, and sign language that is in accordance with the visual learning characteristics of DHH students (Efrina & Kusumastuti, 2020). Research shows that the use of captions and visual elements in learning videos can significantly improve concept comprehension compared to text-based or lecture-based

learning methods alone. In addition, the use of videos equipped with sign language and procedural visualizations has proven effective in supporting the learning of vocational skills that demand demonstrations of practical steps.

On the other hand, the modular learning approach is increasingly used in the context of vocational education because it provides flexibility in the delivery of structured and competency-based material. Modular learning enables learners to study independently, revisit instructional materials repeatedly, and progress according to their own learning pace. This approach has been widely recognized for promoting learner autonomy, self-regulated learning, and competency-based instruction in vocational. This is especially relevant for DHH students who have diversity in language skills and visual learning preferences. Studies show that video-based learning combined with a modular structure can improve learning motivation, independence, and learning outcomes of DHH students (Yessengaliyev et al., 2025).

However, the implementation of accessible video-based learning still faces various obstacles (Efrina et al., 2023). Many learning video content does not fully meet accessibility principles, such as the lack of accurate captions, lack of sign language integration, and visual

design that is not optimal to support the understanding of DHH students (Megaiswari et al., 2019). In addition, the development of learning media often does not refer to the principles of inclusive learning design, such as Universal Design for Learning (UDL), which should be the basis for creating a learning environment that can be accessed by all learners without exception (Wilson, 2017).

The development of research in the field of learning technology for DHH students shows an increasing trend in the past decade (Efrina et al., 2018). Bibliometric studies indicate a significant growth in scientific publications focusing on the use of multimedia, augmented reality, and video-based learning to improve the accessibility and effectiveness of inclusive learning (Krzysztof & Carlos, 2024). However, most research is still partial and focuses on specific aspects, such as the use of captions, the development of sign language applications, or multimedia design, without integrating all of these components into a comprehensive learning model (Mehta et al., 2019).

These limitations indicate that there is an urgent need to conduct a systematic study that is able to integrate various research findings related to accessible modular video-based learning, especially in the context of vocational education for DHH students. Systematic Literature Review (SLR) is the right approach to identify, analyze, and synthesize empirical evidence in a comprehensive and structured manner, so as to provide a comprehensive overview of best practices, effectiveness, and challenges in its implementation.

Based on this background, this study aims to systematically examine the implementation of accessible video-based modular learning in vocational education for students with hearing disabilities. Specifically, this study is directed to answer the following research questions:

A. Research Questions (RQ)

- RQ1: How is the implementation of accessible modular video-based learning in vocational education for DHH students?
- RQ2: What types of accessibility features (such as sign language, captions, and visual support) are integrated in video-based learning for DHH students?
- RQ3: How does modular video-based learning affect the development of vocational skills of DHH students?
- RQ4: What are the challenges and limitations in implementing video-based learning that is accessible DHH students?

By answering these research questions, this study is expected to make a theoretical contribution to the development of inclusive technology-based learning models as well as practical contributions for educators, researchers, and learning media developers in designing

vocational learning systems that are more effective, adaptive, and oriented to the needs of DHH students.

II. Method

A. Research Design

This study uses the Systematic Literature Review (SLR) approach to comprehensively examine the development and implementation of *accessible video-based modular learning* in vocational education for DHH students. This approach was chosen because it is able to integrate findings from various studies in a systematic, transparent, and scientific evidence-based manner.

The SLR process in this study refers to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework which allows the literature selection process to be carried out in a structured manner through the stages of identification, screening, eligibility, and inclusion (Zhang et al., 2020). In addition, this study is also equipped with a descriptive analysis of the characteristics of the research methodology to provide an overview of the scientific approach used in related studies (Recker, 2021).

B. Literature Search Strategy

Literature search was conducted through the Scopus database using a combination of keywords that were systematically designed based on the focus of the research. The search strategy uses the Boolean operator as follows: ("deaf" OR "hard of hearing" OR "hearing impairment" OR "hearing loss" OR DHH) AND ("video" OR "video-based learning" OR "video tutorial" OR multimedia) AND ("module" OR "modular learning") AND ("vocational education" OR vocational OR skills) AND (accessibility OR inclusive OR inclusion)

The search was limited to publications in the 2015-2025 time frame to ensure that the studies analyzed represent the latest developments in the field of technology-based learning for learners with DHH students.

C. Inclusion and Exclusion Criteria

To maintain the quality and relevance of the analyzed studies, strict selection criteria were set as presented in Table 1.

Table 1. Study Inclusion and Exclusion Criteria

Aspects	Criteria Inclusion	Exclusion Criteria
Types of publications	Scientific journal articles	Proceedings, books, reports
Language	English	Other than English
Time range	2015–2025	Outside of the period
Topics	Video-based learning, modular learning, hearing disability education	Irrelevant to the focus of the research

Method	Empirical studies and systematic reviews	Conceptual/non-empirical articles
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These criteria are used consistently throughout the selection stage to ensure that the selected articles are truly relevant and have adequate methodological quality.

D. Study Selection Process Based on PRISMA

The article selection process is carried out in stages by referring to the PRISMA diagram. This stage starts from identification to determination of the final article analyzed.

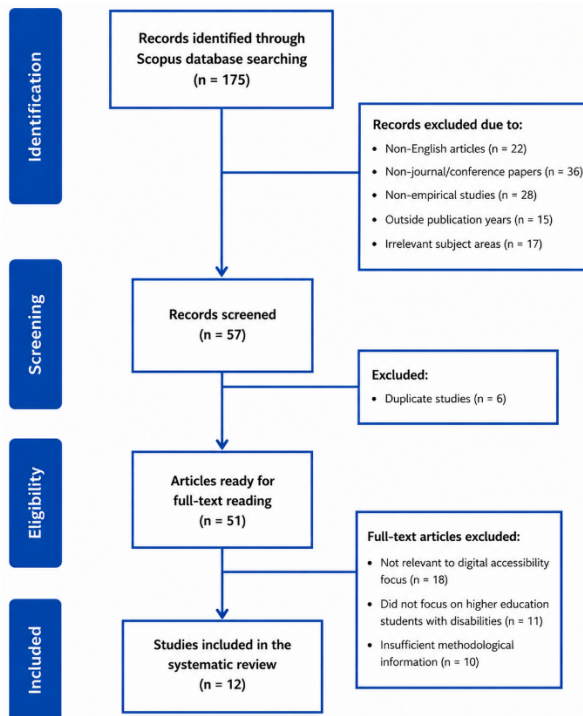


Fig. 1. PRISMA Flow Diagram of the Study Selection Process

Figure 1 describes in detail the flow of literature selection in this study. In the initial stage (*identification*), as many as 175 articles were obtained from the search results in the Scopus database. Furthermore, an elimination process is carried out based on exclusion criteria, namely non-English articles, not journal articles, non-empirical studies, outside the range of years of publication, and irrelevant topics.

At the *screening stage*, a review of titles and abstracts was carried out which resulted in 57 articles that were considered relevant. Then, at the *eligibility stage*, the full text was read to the remaining articles, so that 51 articles were obtained that were worthy of further evaluation.

After duplicate removal and title–abstract screening, 57 records remained for eligibility assessment. Full-text screening was then conducted on these studies. Of these, 39 articles were excluded because they did not specifically address accessible video-based learning for DHH students in vocational education, lacked sufficient methodological

information, or did not report empirical findings relevant to the review objectives. Consequently, 12 studies met all inclusion criteria and were included in the final synthesis. This PRISMA diagram shows that the selection process is carried out strictly and transparently, thereby increasing the credibility of the research results.

E. Data Extraction and Analysis

Data were extracted using a standardized extraction form that included the following information: author(s), publication year, country, study design, participant characteristics, educational setting, accessibility features, type of video-based learning intervention, vocational learning context, and major findings. The extracted data were independently reviewed and organized into thematic categories corresponding to the four research questions. This process aims to make it easier to identify patterns and compare between studies.

A thematic narrative synthesis was employed to integrate findings across the included studies. Similar findings were grouped into recurring themes related to (1) implementation of accessible video-based modular learning, (2) accessibility features, (3) vocational learning outcomes, and (4) implementation challenges. These themes were subsequently synthesized to answer each research question systematically.

F. Quality Assessment

To ensure the methodological quality of the included studies, a critical appraisal process was conducted before the final synthesis. Each article was evaluated using quality indicators adapted from the Mixed Methods Appraisal Tool (MMAT), considering the clarity of research objectives, appropriateness of the study design, sampling procedures, data collection methods, data analysis, and validity of conclusions. Studies that did not provide sufficient methodological information or failed to meet the minimum quality requirements were excluded during the eligibility stage. This quality assessment strengthened the credibility and trustworthiness of the synthesized findings.

G. Distribution Analysis of Research Methodology

In addition to analyzing the substance of the research, this study also examines the distribution of the methodological approaches used in the analyzed articles. Figure 2 shows that the research methods in the analyzed studies are quite diverse. The most dominant approach was the Systematic Literature Review (25%), which showed an increasing interest in researchers conducting evidence-based synthesis. In addition, the survey/questionnaire, experimental/quasi-experimental, and expert consensus method each had a proportion of 16.7%, which shows a balance between quantitative approaches and expert-based model development.

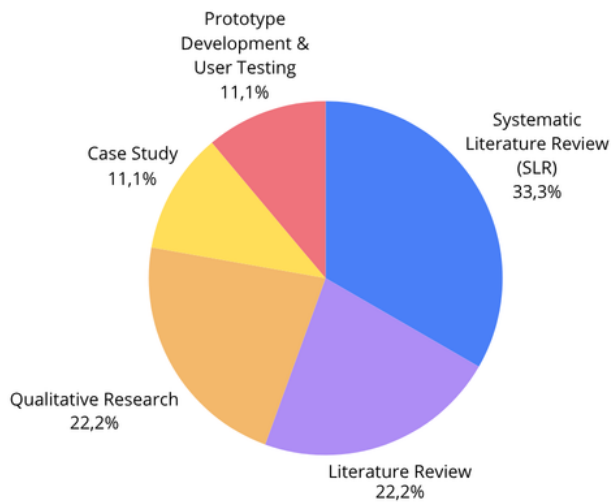


Fig. 2. Distribution of Research Methodologies (N = 12 Articles)

Meanwhile, the Research and Development (R&D), qualitative (interview), and scoping review methods each have a smaller proportion (8.3%). This indicates that although product development and qualitative exploration have been carried out, the number is still relatively limited compared to other approaches. This distribution provides an overview that research in the field of video-based learning for students with hearing disabilities is still developing and uses various methodological approaches, including exploratory, experimental, and literature synthesis.

H. Research Validity and Reliability

The trustworthiness of this review was enhanced through a transparent and systematic review process

following the PRISMA guidelines. Clearly defined inclusion and exclusion criteria were consistently applied throughout the screening process. In addition, the use of a standardized data extraction form and quality appraisal procedure minimized selection bias and improved the consistency of data synthesis. These procedures enhance the credibility, dependability, and transparency of the review findings.

III. Results and Discussion

A. Characteristics of the Studies Analyzed

Based on the PRISMA-based selection process, 12 articles were identified that met the inclusion criteria. The studies reflect a variety of methodological approaches, geographic contexts, and research focuses oriented towards the development and implementation of video-based learning that is accessible to students with hearing disabilities.

Overall, the included studies were conducted across diverse geographical regions, including Asia, Europe, North America, and South America, indicating growing international interest in accessible technology for Deaf and Hard of Hearing (DHH) learners. Most studies employed empirical research designs such as experimental, survey, qualitative, and mixed-method approaches, while several studies adopted systematic or scoping review methodologies. The reviewed studies primarily focused on accessible video-based learning, assistive technologies, modular learning, and inclusive instructional design within vocational or technology-supported educational contexts. To provide a comprehensive overview of the study's characteristics, Table 2 is presented.

Table 2. Summary of Included Studies

Author(s) & Year	Country	Method	Sample	Focus	Key Findings
(RAHIM et al., 2025)	Malaysia	Expert consensus (NGT & FDM)	11 experts	Immersive learning model	AR-based ILPS models are effective for practical skills
(Chai et al., 2017)	China	Experimental	-	Sign language system	Multimedia improves learning effectiveness
(Ibrahim et al., 2016)	Malaysia	Survey	58 students	Learning module	Visual module required
(Sabdan et al., 2025)	Malaysia	Fuzzy Delphi	19 experts	Pedagogical module	Valid with high consensus
(Alonzo & Hau, 2025)	USA	Qualitative R&D (ADDIE)	15	Video accessibility	Captions are very important
(Wagino, 2025)	Indonesia	-	-	CAI learning	Multimedia increases learning motivation
(Westin et al., 2022)	Sweden	Scoping review	-	AR learning	Effective yet complex
(Debevc et al., 2015)	Slovenia	Experimental	51	Caption video	Significantly improve understanding
(Yessengaliyev et al., 2025)	Kazakhstan	Survey	51	Online learning	Modular & visual efektif
(Rodríguez-Correa et al., 2023)	Colombia	Systematic review	27 studies	Assistive technology	Dominant video & caption
(Almalhy, 2022)	Saudi Arabia	Mixed method	54	Video tutorial	Caption + sign optimal

It should be noted that the bibliometric analysis was conducted using all 175 documents retrieved during the

initial Scopus search in order to describe the overall publication landscape of accessible video-based learning

research. In contrast, the systematic thematic synthesis presented in this review was based solely on the 12 studies that met all inclusion criteria after the PRISMA screening process.

1) RQ1. Implementation of Accessible Video-Based Modular Learning

The analysis of the 12 included studies indicates that accessible video-based modular learning has been increasingly implemented in vocational education to support the learning needs of Deaf and Hard of Hearing (DHH) students. Most studies employed instructional videos integrated with modular learning materials, enabling students to learn independently, review content repeatedly, and progress at their own pace. The reviewed interventions incorporated various digital technologies, including computer-assisted instruction (CAI), augmented reality (AR), online learning platforms, and multimedia applications to improve practical skill acquisition and learner engagement. Overall, the findings demonstrate a clear shift toward learner-centered and technology-enhanced instructional approaches that promote accessibility and inclusivity in vocational education.

2) RQ2. Accessibility Features Integrated in Video-Based Learning

The reviewed studies consistently highlight accessibility features as essential components of effective video-based learning for DHH students. Closed captions were the most frequently implemented feature, followed by sign language interpretation, visual illustrations, animations, and step-by-step procedural demonstrations. Several studies reported that combining multiple accessibility features produced better learning outcomes than relying on a single feature alone. More recent studies also incorporated emerging technologies, such as augmented reality (AR), virtual reality (VR), and artificial intelligence (AI), to enhance visualization, interactivity, and personalized learning experiences. These findings suggest that effective accessibility requires the integration of multiple complementary supports rather than isolated technological solutions.

3) RQ3. Effects of Video-Based Modular Learning on Vocational Skills

The findings demonstrate that accessible video-based modular learning positively influences vocational learning outcomes among DHH students. Across the reviewed studies, improvements were reported in conceptual understanding, procedural knowledge, practical skill performance, learning motivation, and independent learning. The modular structure enabled students to revisit instructional materials according to their individual learning pace, while visual demonstrations facilitated the acquisition of practical competencies required in vocational education. In addition to improving academic performance, several studies indicated that accessible learning videos enhanced students' confidence and readiness to perform vocational tasks in authentic learning environments.

4) RQ4. Challenges and Limitations in Implementation

Despite the reported benefits, several implementation challenges remain. Many studies identified limited educator competence in designing accessible learning videos, insufficient institutional support, inadequate accessibility guidelines, and unequal access to digital technologies as major barriers. Furthermore, numerous instructional videos still lack accurate captions, sign language interpretation, and inclusive visual design that adequately support DHH students. These findings indicate that technological innovation alone is insufficient to ensure inclusive vocational education. Successful implementation also requires teacher professional development, institutional commitment, appropriate accessibility standards, and continuous evaluation of learning resources.

B. Bibliometric Analysis

The bibliometric overview indicates a steady expansion of research on accessible video-based learning between 2015 and 2025. The annual growth rate of 8.84% demonstrates increasing scholarly attention toward inclusive digital learning, particularly following the rapid adoption of online education during and after the COVID-19 pandemic. The relatively high average citation rate further suggests that accessibility research has gained substantial scientific recognition across multiple disciplines.



Fig. 3. Timespan, Sources, Documents, Annual Growth Rate

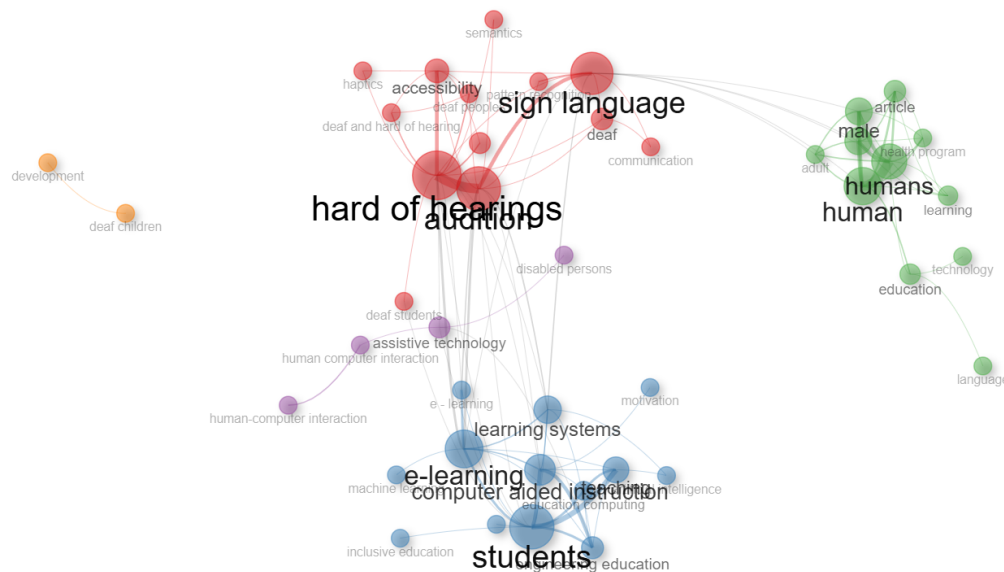


Fig. 4. Network Visualization

The network visualization reveals three dominant thematic clusters representing the current direction of research. The first cluster centers on Deaf and Hard of Hearing (DHH) learners and sign language, highlighting the importance of visual communication. The second cluster focuses on digital learning environments, including e-learning systems and technology-supported instruction.

The third cluster emphasizes educational and human-centered perspectives, suggesting that accessibility research increasingly integrates technological innovation with pedagogical considerations. These interconnected clusters demonstrate that accessible video-based learning is evolving as an interdisciplinary research field.

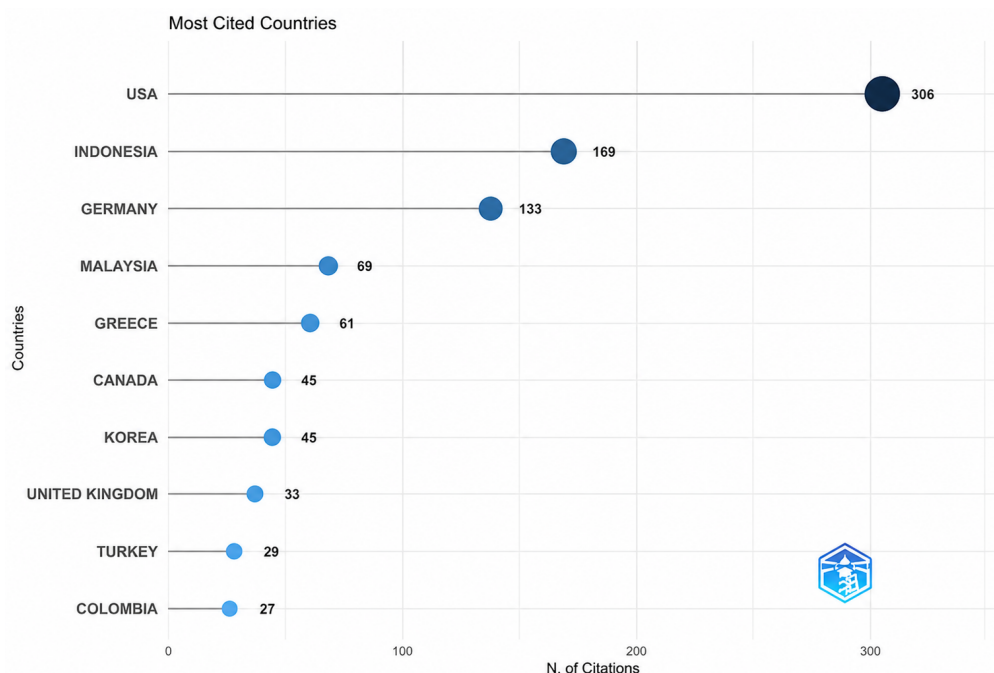


Fig. 5. Most Cited Countries

The *Most Cited Countries* figure shows the distribution of countries by number of citations. The United States dominates with the highest number of citations, followed by Indonesia and Germany. This shows that research

contributions do not only come from developed countries, but also from developing countries such as Indonesia, which have a significant role.

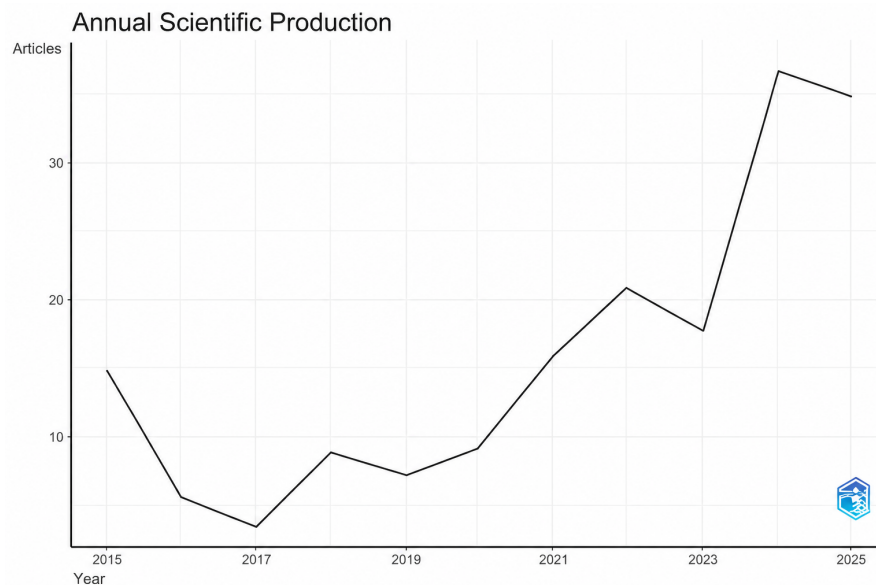


Fig. 6. Annual Scientific Production

The upward trend in publications observed after 2020 reflects the accelerated adoption of digital learning technologies following the COVID-19 pandemic. This trend also indicates growing international recognition of

accessibility issues in vocational and inclusive education. The continued increase in publication output suggests that accessible educational technology remains an active and expanding area of research.

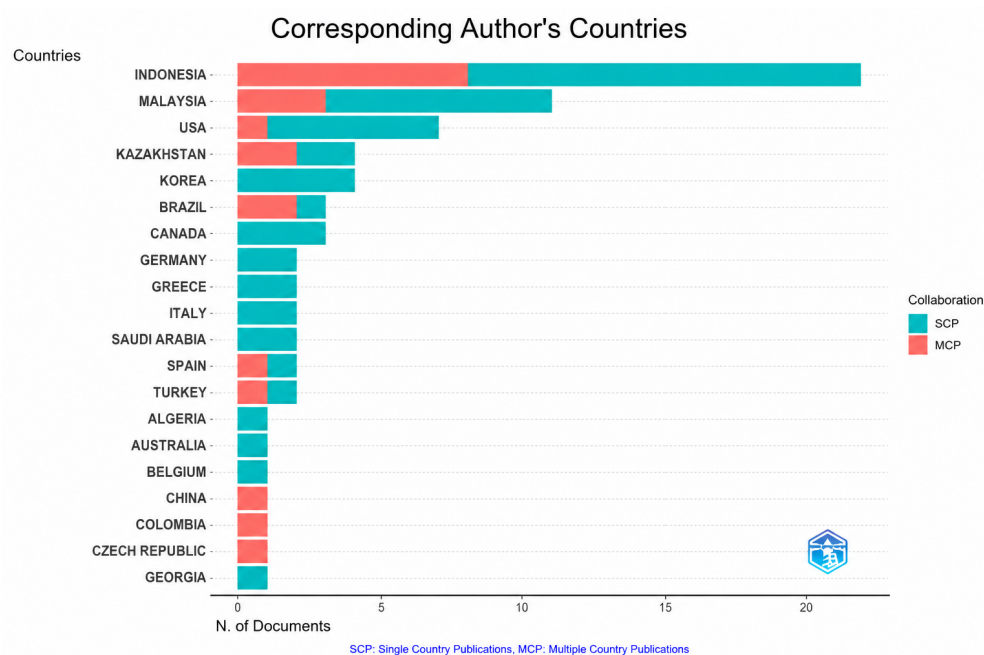


Fig. 7. Corresponding Author's Countries

The *Corresponding Author's Countries* image shows the distribution of the countries of the authors of the correspondence as well as the patterns of international collaboration. Indonesia and Malaysia are seen as dominant in the number of publications, while international collaborations (MCPs) show that accessibility research is developing through a global network.

C. Synthesis of Key Findings

The results of the synthesis of the 12 studies analyzed showed several key consistent patterns in the development and implementation of video-based learning for DHH students. First, video- and visual-based learning emerged as the most dominant and effective approach. Most studies confirm that the visual characteristics of videos are able to accommodate the learning needs of students with hearing disabilities more optimally than conventional text-based or

audio-based methods. This effectiveness is further increased when videos are combined with sign language elements and *closed captions*, allowing for a more comprehensive understanding of the learning material.

Second, the existence of accessibility features is a key factor in determining the success of learning. The findings show that elements such as subtitles, visual support, and the use of *assistive technology* not only serve as complements, but are essential components in the learning process. These features contribute significantly to increasing *engagement*, concept understanding, and learning independence of DHH students.

Third, the integration of innovative technologies is starting to play an increasingly important role in supporting inclusive learning. Several studies show the use of technologies such as *Augmented Reality (AR)*, *Virtual Reality (VR)*, and artificial intelligence (AI)-based systems that are able to create a more interactive and immersive learning experience. This technology not only increases motivation to learn, but also expands access to learning materials that were previously difficult for DHH students to reach.

However, behind this great potential, there are still various challenges in its implementation. Some of the main obstacles identified include the limited competence of educators in designing accessible learning, the lack of a truly inclusive learning design, and the low level of implementation of accessibility standards in educational institutions. These challenges show that the success of technological innovation in education depends not only on the availability of technology, but also on the readiness of human resources and supportive institutional policies.

D. General Synthesis

Overall, the results of this study indicate that video-based learning that is designed in a modular manner and equipped with accessibility features has great potential in improving the quality of learning for DHH students. This approach is not only able to bridge communication limitations, but also encourage the creation of a more inclusive and adaptive learning experience.

However, the effectiveness of the implementation of this approach is highly determined by several key factors, namely the quality of inclusive learning design, appropriate technology integration, and institutional support in the form of policies, training, and infrastructure provision. Thus, the development of video-based learning for students with hearing disabilities cannot be seen solely as a technological innovation, but as part of the transformation of the education system towards sustainable inclusivity.

This systematic literature review synthesized evidence from 12 empirical studies investigating accessible video-based modular learning for Deaf and Hard of Hearing (DHH) students in vocational education. Overall, the

findings demonstrate that accessible video-based learning contributes positively to concept comprehension, vocational skill development, learner autonomy, and learning motivation. These positive outcomes are largely attributed to the integration of multiple accessibility features, including captions, sign language interpretation, visual supports, and emerging digital technologies. However, the review also identified persistent implementation challenges related to instructional design, teacher competence, technological infrastructure, and institutional support.

E. Video-Based Learning as the Main Approach in Deaf Disability Education

The results of this study confirm that video-based learning is the most dominant and effective approach in the educational context for DHH students. These findings are in line with the main characteristics of DHH students who rely on visual modalities as the main channel in receiving information. Video allows the multimodal presentation of information through a combination of images, text, animation, and sign language, thus being able to bridge the limitations of auditory communication.

In the perspective of learning theory, this effectiveness can be explained through the *multimedia learning* proposed by Mayer, where the integration of visual and verbal elements can improve the cognitive process in understanding information (Mayer, R. E., & Moreno, 2020). In the context of DHH students, visual elements not only function as support, but are the main components in the construction of meaning. Therefore, the optimal learning video design must take into account visual principles that are clear, structured, and easy to interpret.

However, these findings also suggest that the use of video without adequate accessibility features, such as captions and sign language, does not have a significant impact. This confirms that design quality is more important than just the use of technology.

The effectiveness of accessible video-based learning can be explained through the Cognitive Theory of Multimedia Learning, which suggests that learners process information more effectively when verbal and visual information are presented simultaneously. For DHH students, visual channels become the primary pathway for acquiring information; therefore, integrating captions, sign language, images, and procedural demonstrations reduces cognitive load while improving information processing and long-term retention.

F. The Strategic Role of Accessibility Features in Improving the Quality of Learning

Accessibility features such as subtitles, captions, visual support, and *assistive technology* proven to be a determining factor in learning success (Diaz, 2017). These findings reinforce the concept of *Universal Design for Learning (UDL)*, which emphasizes the importance of providing various ways of representing information so that

it can be accessed by all learners (Rogers-Shaw et al., 2018).

In this context, captions do not only serve as a transcription of texts, but as a tool to improve linguistic understanding and literacy. Meanwhile, the use of sign language provides direct access to concepts that may be difficult to understand through text alone. The combination of visuals, text, and sign language creates a learning environment that is more inclusive and responsive to individual needs.

However, it is still found that many educational institutions have not fully adopted accessibility standards such as *the Web Content Accessibility Guidelines (WCAG)*. This shows that there is a gap between technological development and implementation in the field, which needs to be a concern in the development of inclusive education policies.

The findings also support the principles of Universal Design for Learning (UDL), which emphasize providing multiple means of representation, engagement, and expression. Accessible instructional videos incorporating captions, sign language, visual demonstrations, and interactive multimedia represent practical applications of UDL by reducing learning barriers and ensuring equitable access for diverse learners.

G. Learning Transformation through Innovative Technology Integration

The development of technologies such as *Augmented Reality (AR)*, *Virtual Reality (VR)*, and artificial intelligence (AI) opens up new opportunities in creating more interactive and immersive learning experiences. The results of the study show that this technology is able to increase student engagement, strengthen the understanding of abstract concepts, and provide a more contextual learning experience.

In the context of vocational education, the use of immersive technology has become particularly relevant as it allows for the simulation of practical skills that are close to real conditions. This is especially important for students with hearing disabilities who need concrete visual representations in understanding certain procedures or skills.

Emerging technologies such as augmented reality, virtual reality, and artificial intelligence have expanded the potential of accessible vocational education beyond conventional video instruction. These technologies enable learners to visualize abstract concepts, interact with simulated work environments, and receive personalized learning support. Consequently, they enhance learner engagement while providing more authentic vocational learning experiences for DHH students.

However, the implementation of this technology still faces various challenges, such as limited infrastructure, development costs, and lack of technical competence of

educators. Therefore, technology integration must be carried out gradually and accompanied by a strategy for developing human resource capacity.

H. Implementation Challenges and Practice Gaps

Although studies show the great potential of video-based learning and accessible technology, its implementation in the field still faces a number of obstacles. One of the main challenges is the low competence of educators in designing and developing inclusive learning media. Many educators do not have an adequate understanding of accessibility design principles and the use of assistive technology.

In addition, the limitations of a truly inclusive learning design are also a significant obstacle. Most learning media are still designed for general learners without considering the specific needs of students with disabilities. This results in a *digital divide* that widens the gap in access to quality education.

On the other hand, institutional support that is still limited, both in the form of policies, funding, and infrastructure, has slowed down the implementation of accessible learning innovations. Therefore, a systemic approach that involves various stakeholders in creating an inclusive education ecosystem is needed.

I. Theoretical and Practical Implications

Theoretically, the results of this study strengthen the integration between *multimedia learning theory*, *Universal Design for Learning (UDL)*, and technology-based learning approaches in the context of inclusive education. These three approaches complement each other in explaining how DHH students can obtain an optimal learning experience through visual media that is designed in an accessible manner.

The findings of this review have important implications for vocational educators, instructional designers, and policy makers. Educational institutions should prioritize the development of accessible instructional videos that integrate captions, sign language, visual supports, and modular learning materials. Teacher professional development should also include training in accessible instructional design and multimedia development. Furthermore, educational policies should promote accessibility standards that ensure equal learning opportunities for DHH students across vocational education settings.

In practical terms, these findings have important implications for the development of educational policies and practices, particularly in:

- Development of video-based learning media equipped with accessibility features
- Improving educator competence in inclusive learning design
- Contextual integration of innovative technologies in vocational education

- Strengthening institutional policies related to accessibility standards

Thus, the transformation of learning towards an inclusive system requires not only technological innovation, but also a paradigm shift in designing and implementing education.

J. Theoretical Implications

This research contributes to strengthening the integration of several theoretical frameworks in the context of inclusive education, especially for students with hearing disabilities. The findings show that *Multimedia Learning* theory is relevant in explaining how the combination of visual, text, and sign language elements is able to improve information processing. In addition, *the principle of Universal Design for Learning (UDL)* is increasingly proving to be important as a foundation for designing adaptive learning that can be accessed by various characteristics of students.

Furthermore, the results of this study also expand the study of technology-based learning by placing accessibility as a core component, not just a complement. This indicates the need to redefine the concept of digital learning to be more inclusive-oriented.

K. Practical Implications

In practical terms, the results of this study provide several strategic recommendations for various stakeholders:

1) For Educators

Educators need to develop competencies in designing video-based learning media that are not only visually appealing, but also meet accessibility standards, such as the use of captions, sign language, and clear visual support.

2) For Educational Institutions

Institutions need to provide policies and infrastructure support that encourage the implementation of inclusive learning, including training for lecturers/teachers and the development of disability-friendly learning platforms.

3) For Educational Technology Developers

The development of applications and learning media needs to integrate the principles of accessibility from the design for accessibility stage, including the inclusive use of technologies such as AR/VR and AI.

4) For the Next Researcher

Further research is needed to empirically test the effectiveness of video-based learning models in the context of vocational education, especially for students with hearing disabilities.

L. Research Limitations

Although this research has been carried out systematically, there are several limitations that need to be considered.

First, the data sources used are limited to the Scopus database, so relevant studies from other unidentified databases may be missed. Second, the study only included English-language articles in the 2015–2025 time frame, potentially ignoring research contributions in other languages or outside of that period.

Third, variations in the methodology and context of the research in the analyzed studies lead to heterogeneity of findings, so the generalization of results needs to be done carefully. In addition, most of the studies are still exploratory and not many have tested their implementation directly in the context of vocational education for students with hearing disabilities.

1) Strengths

This review provides a comprehensive synthesis of recent empirical evidence on accessible video-based modular learning for DHH students. By combining systematic review procedures with bibliometric analysis, this study offers both an overview of publication trends and an in-depth understanding of instructional practices, accessibility features, learning outcomes, and implementation challenges. This integrated approach provides broader insights than previous reviews focusing on individual technologies or accessibility components

IV. Conclusion

This study concludes that video-based learning that is designed in a modular manner and equipped with accessibility features has significant potential in improving the quality of learning for students with hearing disabilities. This approach accommodates students' visual needs and supports conceptual understanding through a combination of integrated multimedia elements. Accessibility features such as captions, sign language, and visual support have proven to be crucial components in creating an inclusive learning experience. In addition, the integration of innovative technologies such as AR, VR, and artificial intelligence shows great potential in increasing learner interactivity and engagement. However, the successful implementation of video-based learning depends not only on technology, but also on the quality of learning design, educator competence, and adequate institutional support. Therefore, a holistic approach that integrates pedagogical, technological, and policy aspects is needed to realize truly inclusive education. Overall, this study emphasizes that the transformation towards accessible digital learning is a strategic step in improving the equitable distribution of education quality, especially for students with special needs.

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