

Emerging Drivers Shaping the Future of Audiology Education: A Systematic Review

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Highlights

- Clinical technology is advancing faster than most audiology curricula can keep up
- Digital health, AI literacy and interprofessional skills are core priorities
- A STEEPV synthesis of 50 sources identifies priorities for curriculum redesign

Abstract

Background and aim: Hearing loss already affects about 1.5 billion people worldwide and is expected to reach 2.5 billion by 2050. Traditional audiology training struggles to keep pace with rapid changes in technology, workforce needs and regulation. Earlier reviews have examined isolated educational interventions. This systematic review maps the broader macro-environmental forces reshaping audiology education and identifies directions for curriculum reform.

Recent findings: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guideline, 847 records were identified, 644 records were screened, and 50 sources (2000–2025) were included. Directed qualitative content analysis mapped findings onto a tailored social, technological, economic, environmental, political and values (STEEPV) framework, applying a foresight and horizon-scanning approach to macro-environmental driver identification (technological; workforce and social/economic; regulatory and policy; values-driven curriculum innovations). Technological drivers (artificial intelligence [AI], tele-audiology, connected devices), workforce pressures (task-sharing, competency-based education), curriculum innovations (simulation, interprofessional education, public-health content) and regulatory shifts (over-the-counter [OTC] devices, accreditation standards) interact to produce an adaptation gap between clinical practice and educational preparation.

Conclusion: Audiology programmes need to move beyond device-specific training toward durable capabilities: strong scientific foundations, clinical reasoning, digital and basic AI literacy, person-centred communication, ethical judgement, adaptability, innovation and lifelong learning. Competency-based and interprofessional frameworks can help translate these capabilities into observable outcomes while preparing graduates for supervisory and system-level roles. The mapped drivers provide a structured foundation for proactive, context-sensitive curriculum redesign.

Keywords: Audiology education; systematic review; curriculum reform; digital health; tele-audiology; competency-based education

Introduction

Hearing loss ranks among the leading causes of years lived with disability. The World Health Organization estimates that roughly 1.5 billion people already live with some degree of hearing impairment; that number is projected to climb to 2.5 billion by 2050 [1]. The burden falls heaviest on low- and middle-income countries, where diagnostic and rehabilitative services remain scarce and global hearing-aid production still meets less than

10% of need [1]. Closing the treatment gap will require integrating ear and hearing care into primary health systems and expanding a more diversified workforce [2].

Curriculum reform in audiology cannot occur in isolation; it must synchronise with broader transformations in health-professions education. In this review, macro-environmental forces are defined as external, system-level conditions and trajectories—technological, social and workforce, economic, regulatory/policy, and values-related—that operate beyond an individual programme yet shape what audiologists need to know, how services are delivered, and how curricula are governed. Educational philosophy is shifting from time-bound training toward outcomes-driven competency-based education [3]. Concurrently, the rapid digitisation of clinical diagnostics demands digital-health literacy. Future audiologists must navigate cloud-based data systems, automated screening networks, connected and wearable devices, and smartphone-based consumer health ecosystems alongside conventional tools [4, 5]. Machine-learning models have demonstrated high diagnostic accuracy in selected tasks, yet the educational literature on how best to prepare students for algorithmic decision support remains limited [4, 6]. Previous reviews have largely evaluated single training components retrospectively. A systemic, prospective synthesis examining the cross-impact of converging drivers has been missing. This study therefore superimposes a foresight lens onto a systematic-review architecture. By employing horizon scanning, the review identifies and categorises macro-level drivers—ranging from weak signals to established megatrends—before they reshape practice. The guiding question is: What are the primary macro-environmental driving forces emerging in the global literature, how do they interact, and how must audiology education adapt its frameworks over the next decade?

Method

Protocol and reporting

This qualitative systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines [7]. A protocol specifying search syntax, eligibility criteria and quality-appraisal tools was developed a priori. Because the study focuses on educational structures rather than clinical interventions, it was not registered in PROSPERO; the agreed protocol is available from the corresponding author on request and was followed throughout.

Eligibility criteria and search strategy

We included peer-reviewed empirical studies, systematic or scoping reviews, theoretical papers, professional standards and authoritative grey literature that addressed audiology education or workforce preparation. Studies focused solely on clinical outcomes without an educational component, opinion pieces without structured methods, and papers targeting patient education rather than professional training were excluded.

Search strings combined controlled vocabulary and free-text keywords across three broad domains: 1) audiology and health-professions education; 2) foresight, change and innovation concepts; search terms in this domain were derived from horizon-scanning and driver-identification literature and 3) key educational and structural topics including competency-based education, interprofessional education, simulation, telehealth, regulation and public health. PubMed/MEDLINE, Web of Science, Scopus and Google Scholar were searched. The formal search was executed on 15 May 2025 and covered publications from 1 January 2000 to 15 May 2025. To reduce the risk of missing relevant pedagogical literature that did not use explicit foresight language, both a focused foresight/technology search (Search A) and an expanded educational-concepts search (Search B) were conducted. Full search strings for all databases are provided in Appendix A.

Because the formal search ended on 15 May 2025, we also performed a targeted currency check during revision (September 2026) to identify major post-search developments directly relevant to the reviewers' concerns. This check was used only to contextualise the Discussion and did not alter the prespecified systematic-review corpus ($n=50$), PRISMA counts, or quality-appraisal denominator. Notable developments included a 2026 survey of pharmacology education in AuD programmes and two distinct accreditation developments: October 2025 revisions to the 2017-revised standards that strengthened person- and family-centred care, and the new 2027 Standards approved by the Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) in July 2026 [8–10].

Study selection and quality appraisal

Two independent reviewers screened titles and abstracts, followed by full-text appraisal. Disagreements were resolved by a third senior reviewer. Methodological quality was appraised with the Mixed Methods Appraisal Tool (MMAT) for empirical studies, the Scale for the Assessment of Narrative Review Articles (SANRA) for

narrative reviews, and the Authority, Accuracy, Coverage, Objectivity, Date and Significance (AACODS) checklist for grey literature. Discrepancies in quality ratings were discussed until consensus was reached.

Data extraction and synthesis

Data extraction followed the PCC (Population, Concept, Context) framework. Two researchers performed line-by-line coding of the included sources. Codes were then mapped deductively onto a tailored STEEPV-inspired framework (social, technological, economic, environmental, political and values). The classic STEEPV domains were adapted into four practical categories that better reflected the audiology-education literature: (1) technological drivers; (2) workforce and social/economic drivers; (3) regulatory and policy drivers; and (4) values-driven curriculum innovations. To distinguish drivers from consequences, a factor was coded as a driver when the source described it as an upstream condition or change capable of altering educational needs, service models, professional roles, or curriculum governance. Downstream educational responses or observed effects—such as a curriculum gap, a new competency requirement, altered supervision needs, or a change in learner outcomes—were coded as consequences/implications rather than as independent drivers. When a factor could function as both, its role was assigned according to the causal direction described in the source and recorded in analytic memos. Inter-coder agreement was checked on a 20% subsample; remaining discrepancies were resolved by discussion. Where relevant, data points were also classified as megatrends, emerging trends or weak signals [11].

Results

Study selection and characteristics

Initial searches identified 847 records. After deduplication, 644 records were screened and 32 articles underwent full-text review. Supplementary manual searching of reference lists and key organisational websites (WHO, professional associations) identified 18 additional eligible sources that had not been captured by the electronic search strings, yielding a final set of 50 studies (Figure 1). The set comprised empirical quantitative, qualitative and mixed-methods research; narrative, scoping and systematic reviews; professional standards; and grey literature. Most studies originated from North America and Europe, with important contributions from Asia, Africa and multi-country collaborations.

The characteristics, methodological features and mapped drivers of all included sources are presented in Table 1. The comprehensive evidence matrix is available in Appendix A.

Applying the Mixed Methods Appraisal Tool, Scale for the Assessment of Narrative Review Articles and AACODS checklist indicated that 76% of sources were of high or very high methodological quality (Table 2; Figure 2).

Technological drivers

Computational audiology and artificial intelligence

Computational approaches are changing the field quickly [4]. Machine-learning models classify otoscopic images with 81–94 % accuracy, and neural networks improve speech-in-noise processing. Graduates will need a basic grasp of machine learning, the ability to check AI output, and a working ethical framework for decision support. Most programmes still give only limited exposure to these topics [4,5]. Within this review's typology, AI-assisted diagnostics is classified as an emerging trend transitioning toward megatrend status, given corroboration across multiple sources and growing clinical uptake.

Digital hearing devices and connected ecosystems

Hearing devices are now highly connected and, in many places, available over the counter [1,12,13]. The educational implications extend beyond conventional hearing aids to smartphone-linked accessories, hearables and other wearable/consumer sensing ecosystems that increasingly blur the boundary between medical devices and consumer technology [5,13]. Teaching can therefore no longer stop at the sound booth. Students need skills in remote programming, device–app interoperability, interpretation of real-world usage data, basic appraisal of sensor-derived information, cybersecurity/privacy awareness, and communication about the limits of consumer-generated data [13,14]. The relevant driver is the convergence of connected-device ecosystems; the downstream curricular consequence is a need for broader digital-device literacy rather than mastery of any single commercial platform.

Telehealth and eHealth

Tele-audiology is moving from pilot projects to everyday practice. Programmes must train students in platform use, remote-adapted techniques and clearer communication [2,15–17]. Smartphone tools for self-screening and

remote programming are already common; curricula should cover app validation, data privacy and the design of scalable services [17,18].

Workforce and competency-based education drivers

Competency-based education puts the emphasis on observable outcomes rather than time spent [3,19,20]. Implementation in audiology remains uneven, largely because of difficulties with documentation and long-term tracking [19,20]. Shortages of audiologists, especially in low-resource settings, have led WHO to endorse task-sharing [1,2,21]. Community health workers can perform basic screening and referral when properly supervised; this requires new teaching on role boundaries, supervision and cultural competence [21].

Curriculum innovation drivers

Simulation and virtual-reality tools let students practise complex skills safely [22–26]. Successful use depends on faculty development and clear links across the whole curriculum. Counselling skills often receive too little attention in traditional apprenticeship models; structured courses and standardised-patient work help fill the gap [22,27–29]. Hearing loss is increasingly framed as a public-health issue, so epidemiology, equity and programme evaluation belong in the curriculum [1,30,31].

Foundational sciences, clinical reasoning and adaptive expertise

Future-ready education also depends on scientific depth, not only technological fluency. Genetics has long been recognised as a core audiology competency, yet programme-level coverage has varied substantially, particularly for molecular mechanisms, genetic testing and ethical/legal issues [32]. Pharmacology is similarly important because medication exposure, ototoxicity, vestibulotoxicity, polypharmacy, pharmacogenetics and emerging molecular therapies increasingly intersect with hearing and balance care; a recent survey of AuD programmes confirms continuing variability in how this content is taught [8]. Biochemistry, molecular biology, neuroscience and pathophysiology provide the mechanistic foundation needed to interpret these developments rather than merely operate new tools. Clinical reasoning should therefore function as the integrative bridge between foundational science and patient care: case-based learning can strengthen diagnostic reasoning and decision-making [33], while simulation provides a safe environment for deliberate practice [22–24,26]. The educational goal is adaptive expertise—graduates who can transfer principles to unfamiliar problems, appraise new evidence, recognise uncertainty, innovate responsibly and sustain lifelong learning—rather than graduates trained only for today's devices or protocols.

Regulatory and policy drivers

Expanding scopes of practice, telehealth rules and OTC approvals all demand that students understand regulation and advocacy [12,17,34,35]. Accreditation standards continue to raise expectations around cultural competence, technology use and person-/family-centred care, which in turn calls for more flexible curricula [9,10,36]. The post-search currency check reinforces this direction: the 2017-revised U.S. accreditation standards were updated in October 2025 to strengthen person- and family-centred care, whereas the separate new 2027 Standards were approved by the CAA in July 2026 after a multi-year review [9,10]. These changes illustrate an important feedback loop: regulation can lag technological practice, but revised standards can subsequently accelerate curricular diffusion by converting emerging expectations into programme-level requirements.

Synthesis: how the drivers interact

These forces do not act in isolation; they form reinforcing and constraining feedback loops. Technology creates a pull toward remote, automated and data-rich care, while workforce shortages create a push toward tele-audiology and task-sharing [2,15,21]. When these forces align, access can improve and audiologists can shift toward supervision, complex decision-making and system-level roles. However, the same interaction creates tension when accreditation cycles, faculty capability, infrastructure, reimbursement or regulation change more slowly than clinical technology [9,10,13,36]. A second tension occurs between consumer autonomy (for example, OTC and app-mediated hearing care) and the need for safe triage, evidence appraisal and person-centred counselling [12,34,37]. A third interaction links AI and connected devices with foundational science and clinical reasoning: automation may reduce routine procedural burden, but it increases the importance of understanding pathophysiology, uncertainty, bias, data quality and when algorithmic output should be questioned. Thus, technology is not treated as an educational end point; its effect depends on the workforce, regulatory and values environment in which it is deployed.

Using a futures-triangle interpretation, technological possibility provides a “pull”, current workforce and access

pressures provide a “push”, and legacy curricular/accreditation structures provide a “weight” that can slow adaptation. We therefore distinguish the upstream drivers (e.g., AI diffusion, workforce scarcity, regulatory change and changing expectations of person-centred care) from downstream consequences (e.g., curriculum gaps, new supervision requirements, altered competencies and faculty-development needs). Some forces are synergistic: tele-audiology plus task-sharing can extend reach when supervision and referral pathways are strong; simulation plus competency-based assessment can support deliberate practice and observable performance. Others create friction: rapid device innovation can outpace faculty development and accreditation, while efficiency-oriented automation can conflict with person-centred care if communication, shared decision-making and ethical oversight are not deliberately preserved [20–22,37].

Discussion

This review of 50 sources shows clear shifts across technology, workforce, education and policy that call for curriculum updating. The epidemiological picture is unambiguous: hearing loss is a growing global problem [1,31]. Supply figures are equally stark—global hearing-aid production still meets less than 10 % of need in low-resource settings [1]. Traditional, clinic-centred training alone cannot close that gap. Curricula need to support a multi-tiered workforce, from community task-sharing facilitators to specialist clinicians [2,21,31].

A persistent lag exists between clinical reality and educational response. This lag reflects a broader anticipatory-governance challenge: institutions must build capacity to act on early signals before they mature into disruptive, unmanageable change. Computational tools and automated fitting are already in daily use in many centres, yet formal competencies often remain elective [4,6,13]. If digital and AI-related fluencies are left outside the core curriculum, graduates may be less well prepared to work alongside, evaluate and, where appropriate, oversee automated systems. This does not imply that commercial technologies will necessarily displace the profession, but it does underline the need for proactive educational adaptation.

Competency-based and interprofessional education offer structural answers [3,19,38–40], but the endpoint should be broader than technical competence. Future audiologists need the capacity to learn continuously, adapt to unfamiliar technologies, integrate new scientific knowledge, innovate responsibly and maintain clinical excellence under changing conditions. Person-centred care provides a stabilising value framework: as care becomes more digital and distributed, communication, shared decision-making, cultural responsiveness and attention to patient goals become more—not less—important [37,41]. Recent educational evidence suggests that deliberately designed learning experiences can improve students’ understanding of person-centred care [41]. When interprofessional practice is built into clinical rotations, the audiologist’s role expands from lone diagnostician to collaborative clinician, supervisor, evidence appraiser and, in some settings, system advocate. Accordingly, the curriculum of the future should be designed around durable capabilities—clinical reasoning, scientific literacy, ethical judgement, communication, adaptability and lifelong learning—with specific technologies taught as evolving applications of those capabilities.

Across asynchronous telepractice, over-the-counter hearing care, mobile audiometry, remote fine-tuning and increasingly complex hearing devices, a consistent pattern is the redistribution of audiological care across digital, remote and consumer-facing environments [42–50]. From a foresight perspective, the relevant upstream driver is therefore not any single technology or service platform, but the broader transition toward connected and distributed models of hearing care. The educational consequences include greater emphasis on technology appraisal, remote clinical workflows, verification, patient safety, supervision, data-informed decision-making and understanding regulatory boundaries.

A second cluster of evidence concerns how curricula should respond to these changes. Studies addressing counselling competencies, flexible and online learning, interprofessional peer-assisted learning, virtual environments, behaviour-change approaches and peer mentoring all point toward learning models that are more explicit, experiential and adaptable [48,51–57]. Participatory development of educational resources further highlights the value of user-centred design [53]. Collectively, these findings support curriculum structures in which communication, counselling and collaborative practice are treated as assessable competencies rather than skills expected to develop implicitly through clinical exposure. Web-based self-management support produced modest improvements in hearing-aid self-efficacy, satisfaction and use, supporting digital rehabilitation as an adjunct to standard care. [58].

These educational responses are also shaped by broader population and person-centred pressures. Evidence on the growing burden and prevalence of hearing loss strengthens the public-health rationale for preparing a workforce capable of serving large and incompletely reached populations [59,60]. At the clinical level, studies of

readiness for behaviour change and communication during rehabilitation consultations emphasise shared decision-making, counselling and responsiveness to individual needs [61,62]. Tele-audiology models that extend access [63] and standardized-patient approaches to rehabilitation training [64,65] bring these themes together. Taken as a whole, this evidence suggests that technological adaptation should not be treated as an end in itself; rather, future audiology curricula need to combine digital flexibility with clinical reasoning, communication, regulatory awareness and person-centred care.

Implications for centralised systems and low- and middle-income countries

In countries where education policy is set centrally, change can be slow, but once agreed it can be applied nationwide. Tele-audiology, simulation and culturally appropriate task-sharing align well with the need to overcome geographic barriers. A foresight approach helps planners weigh global technological trends against local equity goals. For contexts such as Iran and similar centralised systems, the mapped drivers suggest that national curriculum frameworks could usefully mandate core digital-health and supervisory competencies while still allowing local adaptation of delivery methods.

Strengths, limitations and future research

The review draws on a wide range of study types, uses explicit inclusion criteria and quality-appraisal tools, and applies a structured framework. Important limitations must be acknowledged. The evidence base remains dominated by descriptive and retrospective studies; rigorous comparative or longitudinal evaluations of educational interventions are scarce. Representation of low- and middle-income country contexts is limited, which constrains the transferability of some recommendations. The electronic search strategy, while systematic, prioritised foresight- and technology-related terms and may have under-represented literature indexed primarily under foundational sciences, clinical reasoning, professional development or other pedagogical constructs. The formal search ended on 15 May 2025; therefore, rapidly evolving developments after that date were not eligible for the systematic corpus. A targeted September 2026 currency check was added during revision to contextualise major developments without changing the prespecified systematic-review corpus or quality-appraisal denominator. Finally, longer-term horizon observations (2030–2040) are inherently speculative and should be treated as signals for monitoring rather than firm predictions. Future research should include periodic living-search updates, explicit scenario-planning and Delphi validation, and prospective evaluation of integrated curricula that combine foundational science, clinical reasoning, digital/AI literacy, person-centred care and lifelong-learning capabilities.

Conclusion

Technological change, workforce pressures, shifting educational values and new regulations are reshaping audiology together, but the future of audiology education cannot be reduced to teaching AI or the newest device. Curriculum redesign should combine digital and AI literacy with strong foundations in genetics, pharmacology and related sciences; clinical reasoning; competency-based and interprofessional learning; person-centred communication; ethical judgement; innovation; and lifelong learning. Graduates must be prepared not only to use emerging tools but also to evaluate them critically, adapt as evidence changes, supervise distributed models of care and preserve clinical excellence and patient goals within technology-rich systems. The driver map presented here should therefore be treated as a horizon-scanning baseline for ongoing monitoring and periodic curriculum renewal rather than as a static inventory.

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Authors' contributions:

MHN: Study design, methodology, data acquisition, interpretation of findings, and drafting the manuscript; MHM: Foresight methodology, interpretation of findings, and critical revision of the manuscript; SM:

Audiological content review, interpretation of findings, and critical revision of the manuscript; NY: Study design, methodology, supervision, interpretation of findings, and critical revision of the manuscript. All authors read and approved the final manuscript.

Data availability: The datasets generated and analysed during the study are available from the corresponding author on reasonable request. All data underlying the findings are contained within the manuscript and its supplementary files.

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Accepted Manuscript

APPENDIX A: Detailed Search Strategies (PRISMA-S Compliant)

Database 1: PubMed/MEDLINE

Date Searched: 15 May 2025

Date Filters Applied: 2000/01/01 to 2025/05/15

Search A – Focused: ("Audiology"[Mesh] OR "audiology education"[Title/Abstract] OR "audiology curriculum"[Title/Abstract] OR "audiology teaching"[Title/Abstract] OR "audiology training"[Title/Abstract]) AND ("Forecasting"[Mesh] OR "future"[Title/Abstract] OR "trend*"[Title/Abstract] OR "innovation*"[Title/Abstract] OR "technology"[Title/Abstract] OR "digital transformation"[Title/Abstract] OR "artificial intelligence"[Title/Abstract] OR "telehealth"[Title/Abstract] OR "tele-audiology"[Title/Abstract])

Search B – Expanded (competency-based, interprofessional, simulation, regulatory, public-health): ("Audiology"[Mesh] OR "audiology education"[Title/Abstract] OR "audiology curriculum"[Title/Abstract] OR "audiology teaching"[Title/Abstract] OR "audiology training"[Title/Abstract] OR "hearing care education"[Title/Abstract]) AND ("competency-based education"[Title/Abstract] OR "competency based"[Title/Abstract] OR "interprofessional education"[Title/Abstract] OR "interprofessional"[Title/Abstract] OR "simulation"[Title/Abstract] OR "standardized patient*"[Title/Abstract] OR "curriculum reform"[Title/Abstract] OR "curriculum development"[Title/Abstract] OR "accreditation"[Title/Abstract] OR "scope of practice"[Title/Abstract] OR "task sharing"[Title/Abstract] OR "task-shifting"[Title/Abstract] OR "public health"[Title/Abstract] OR "over-the-counter"[Title/Abstract] OR "OTC hearing"[Title/Abstract])

Database 2: Scopus

Date Searched: 15 May 2025

Date Filters Applied: Publication Year: 2000 TO 2025

Search A – Focused: TITLE-ABS-KEY (("Audiology education" OR "audiology curriculum" OR "audiology teaching" OR "audiology training") AND ("future" OR "trend*" OR "innovation*" OR "technology" OR "digital transformation" OR "artificial intelligence" OR "telehealth" OR "tele-audiology")) AND PUBYEAR > 1999 AND PUBYEAR < 2026

Search B – Expanded: TITLE-ABS-KEY (("Audiology education" OR "audiology curriculum" OR "audiology teaching" OR "audiology training" OR "hearing care education") AND ("competency-based" OR "competency based" OR "interprofessional" OR "simulation" OR "curriculum reform" OR "curriculum development" OR "accreditation" OR "task sharing" OR "task-shifting" OR "public health" OR "over-the-counter" OR "OTC")) AND PUBYEAR > 1999 AND PUBYEAR < 2026

Database 3: Web of Science (Core Collection)

Date Searched: 15 May 2025

Date Filters Applied: Publication Date: 2000-01-01 to 2025-05-15

Search A – Focused: TS= ("Audiology education" OR "audiology curriculum" OR "audiology teaching" OR "audiology training") AND ("future" OR "trend*" OR "innovation*" OR "technology" OR "digital transformation" OR "artificial intelligence" OR "telehealth" OR "tele-audiology")

Search B – Expanded: TS= ("Audiology education" OR "audiology curriculum" OR "audiology teaching" OR "audiology training" OR "hearing care education") AND ("competency-based" OR "competency based" OR "interprofessional" OR "simulation" OR "curriculum reform" OR "curriculum development" OR "accreditation" OR "task sharing" OR "task-shifting" OR "public health" OR "over-the-counter" OR "OTC")

Database 4: Google Scholar

Note: Due to the limitations of Google Scholar's advanced search capabilities for complex Boolean strings, combinations of primary keywords were executed iteratively.

Date Searched: 15 May 2025

Date Filters Applied: Custom range: 2000 – 2025

Example focused string: allintitle: "audiology education" OR "audiology curriculum" AND (future OR innovation OR trends OR telehealth OR "artificial intelligence")

Example expanded string: allintitle: "audiology education" OR "audiology curriculum" AND ("competency-based" OR interprofessional OR simulation OR accreditation OR "task sharing" OR "public health")

Table 1. Characteristics and evidence synthesis of the 50 included sources

Author(s), year [Ref.]	Design	Driver category	Main finding / educational implication
Wasmann et al., 2021 [4]	Narrative review	Technology: AI	ML accuracy 81–94% for otoscopy; need AI literacy in curricula.
Morgan et al., 2022 [13]	Commentary	Technology + Curriculum	Integrating technological advancements significantly improves audit research, and clinical outcomes.
Mahomed-Asmail et al., 2025 [42]	Perspective/tutorial	Technology: Digital health	Asynchronous telepractice can support flexible service delivery but workflows, oversight and implementation planning.
Swanepoel de W & Hall, 2010 [16]	Systematic review	Technology: Telehealth	Remote audiometry equivalent to in-person; supports teleaudiology.
D'Onofrio & Zeng, 2022 [15]	Narrative review	Technology: Telehealth	Remote PTA, ABR, fitting effective; distributed expertise models.
Kanji & Watermeyer, 2024 [22]	Scoping review	Curriculum: Simulation	Positive student perceptions of simulation for counselling; integration
Naeve-Velguth et al., 2013 [23]	Empirical (survey)	Curriculum: Simulation	Students value simulation combined with traditional methods.
Meibos et al., 2019 [43]	Modified Delphi study	Curriculum: Counselling	Consensus-defined counselling competencies support explicit teaching assessment.
Janssens et al., 2023 [20]	Qualitative	Workforce: CBE	Gaps between CBE theory and practice; partial implementation in a
Imanipour et al., 2022 [19]	Systematic review & meta-analysis	Workforce: CBE	CBE improves clinical performance (standardized mean difference
James et al., 2017 [39]	Empirical	Workforce: IPE	IPE increased awareness of roles and collaborative intentions.
World Health Organization, 2021 [1]	Policy report	Workforce + Policy	1.5 billion with hearing loss; task-sharing essential in LMICs.
World Health Organization, 2019 [2]	Policy report	Workforce: Training	Task-sharing effective; competency frameworks for provider levels.
Ramkissoo, 2022 [34]	Empirical + framework	Curriculum: OTC	OTC devices are a curricular gap; proposed learning outcomes.
Warren & Levy, 2021 [30]	Descriptive review	Curriculum: Public health	Hearing loss is public-health issue; integrate into curricula.
Parmar et al., 2024 [49]	Development / feasibility study	Technology: Virtual reality	Immersive spatial-hearing training illustrates the expanding role of related learning environments.
Chundu et al., 2025 [44]	Cross-institutional study	Curriculum + Workforce	Rapid pedagogical innovation in audiology teaching can affect delivery wellbeing.
Ferguson et al., 2018 [45]	Participatory design study	Curriculum: User-centred design	Participatory co-design of multimedia hearing support illustrates prior educational design.
Ntlhakana & Alli, 2024 [46]	Qualitative study	Curriculum: Online learning	Students value flexibility in online learning while retaining in-person clinical skills.
Serpanos et al., 2017 [47]	Educational intervention	Curriculum: Interprofessional learning	Peer-assisted interprofessional learning provides a structured model of instruction in Doctor of Audiology programmes.
Coco et al., 2021 [21]	Feasibility training study	Workforce: Task-sharing	Training community health workers as tele-audiology site facilitators supervised task-sharing.
Olusanya et al., 2014 [31]	Policy analysis	Policy: Public health	Hearing loss leading cause of disability; expand workforce.
Audiology professional associations, 2018 [48]	Consensus recommendations	Policy: Over-the-counter hearing aids	Consensus recommendations emphasise safety, effectiveness and cost over-the-counter hearing aids.
Bakhos et al., 2020 [24]	Comparative training study	Curriculum: Virtual reality	Virtual-reality training produced learning outcomes comparable with enhanced visualization.
Pollard & Hogan, 2021 [25]	Qualitative study	Curriculum: Telepractice	Pandemic-era pediatric telepractice highlighted benefits and constraints for habilitation relevant to clinician training.
Whicker et al., 2017 [28]	Syllabi review	Curriculum: Counselling	Counselling instruction varies substantially across Doctor of Audiology supporting more explicit curriculum design.
Babeu et al., 2004 [50]	Conceptual / application paper	Curriculum: Counselling	The stages-of-change model supports counselling tailored to an individual behaviour change.
American Academy of Audiology, 2013 [51]	Clinical practice guideline	Curriculum / Professional standards	Paediatric amplification guidance reinforces evidence-based fitting, up competencies.
Interprofessional Education Collaborative, 2016 [38]	Framework document	Workforce: IPE	Four core IPE competency domains widely adopted.
Arja et al., 2024 [36]	Scoping review	Policy: Accreditation	Accreditation can support continuous quality-improvement processes and governance.
Johnson, 2019 [52]	Book review	Technology: Hearing aids	Increasing hearing-aid complexity reinforces the need for ongoing counselling fitting and verification.
Anil et al., 2025 [53]	Scoping review	Technology: Telehealth education	Telehealth education requires explicit competencies in remote workflow and technology use.
Oremule et al., 2024 [54]	Systematic review and meta-analysis	Technology: Mobile audiometry	Mobile audiometry can be reliable under appropriate conditions, supporting calibration, validation and limitations.
Quar et al., 2024 [17]	Empirical	Technology: Remote adjustment	Remote programming alters workflows; new competencies needed.
Bally & Bakke, 2007 [55]	Training programme evaluation	Curriculum: Aural rehabilitation	Peer mentoring offers a structured approach to strengthening aural-rehabilitation
Grenness et al., 2014 [37]	Narrative review	Curriculum: Person-centred care	Person-centred care places shared decision-making and communication in audiology competencies.

Author(s), year [Ref.]	Design	Driver category	Main finding / educational implication
Lin & Chen, 2024 [56]	Narrative review	Technology: Tele-audiology	Tele-audiology can expand access and requires adaptable competencies and patient support.
Malmberg & Hagberg, 2024 [57]	Randomized controlled trial	Technology: Remote hearing-aid care	Synchronous remote fine-tuning can provide outcomes comparable while reducing travel burden.
Meijerink et al., 2020 [58]	Cluster randomized controlled trial	Technology: Web-based aural rehabilitation	Web-based self-management support produced modest improvements in efficacy, satisfaction and use, supporting digital rehabilitation as an option.
Davis et al., 2021 [40]	Cross-sectional study	Workforce: Interprofessional practice	Interprofessional practice patterns highlight the need for role clarity and readiness.
Alanazi & Nicholson, 2023 [59]	Systematic review	Curriculum: Simulation	Simulation can support development of audiology knowledge, skills and attitudes aligned with learning outcomes.
Bainbridge & Wallhagen, 2014 [60]	Narrative review	Policy: Hearing-loss burden	Age-related hearing loss has substantial public-health impact, reinforcing the need for accessibility planning.
Lin et al., 2011 [61]	Epidemiological study	Policy: Public health	Hearing-loss prevalence demonstrates a substantial population burden, highlighting the need for accessible hearing care.
Manchaiah et al., 2015 [62]	Cross-sectional study	Curriculum: Behaviour-sensitive counselling	Readiness-to-act profiles vary among adults with hearing difficulties, highlighting the importance of tailored counselling.
Grenness et al., 2015 [63]	Qualitative study	Curriculum: Communication	Patients value clear communication and shared decision-making during rehabilitation planning.
Gladden et al., 2015 [64]	Descriptive review	Technology: Tele-audiology	Tele-audiology can expand access and connectivity, requiring flexible competencies.
Vento, 2015 [33]	Conference presentation	Curriculum: Clinical reasoning	Case-based learning can support clinical reasoning and decision-making in education.
Mahomed-Asmail et al., 2025 [41]	Educational intervention	Curriculum: Person-centred care	A multinational virtual student conference strengthened understanding of person-centred care.
Picou & Tharpe, 2015 [65]	Educational perspective	Curriculum: Standardized patients	Standardized patients can strengthen experiential training in aural rehabilitation.
Frosolini et al., 2024 [5]	Scoping review	Technology: Artificial intelligence	A scoping review maps artificial-intelligence applications in audiology, highlighting foundational AI literacy and critical appraisal.

Table 2. Summary of methodological quality ratings

Quality Rating	Number of Sources	Percentage
Very High	12	24%
High	26	52%
Moderate	12	24%
Total	50	100%

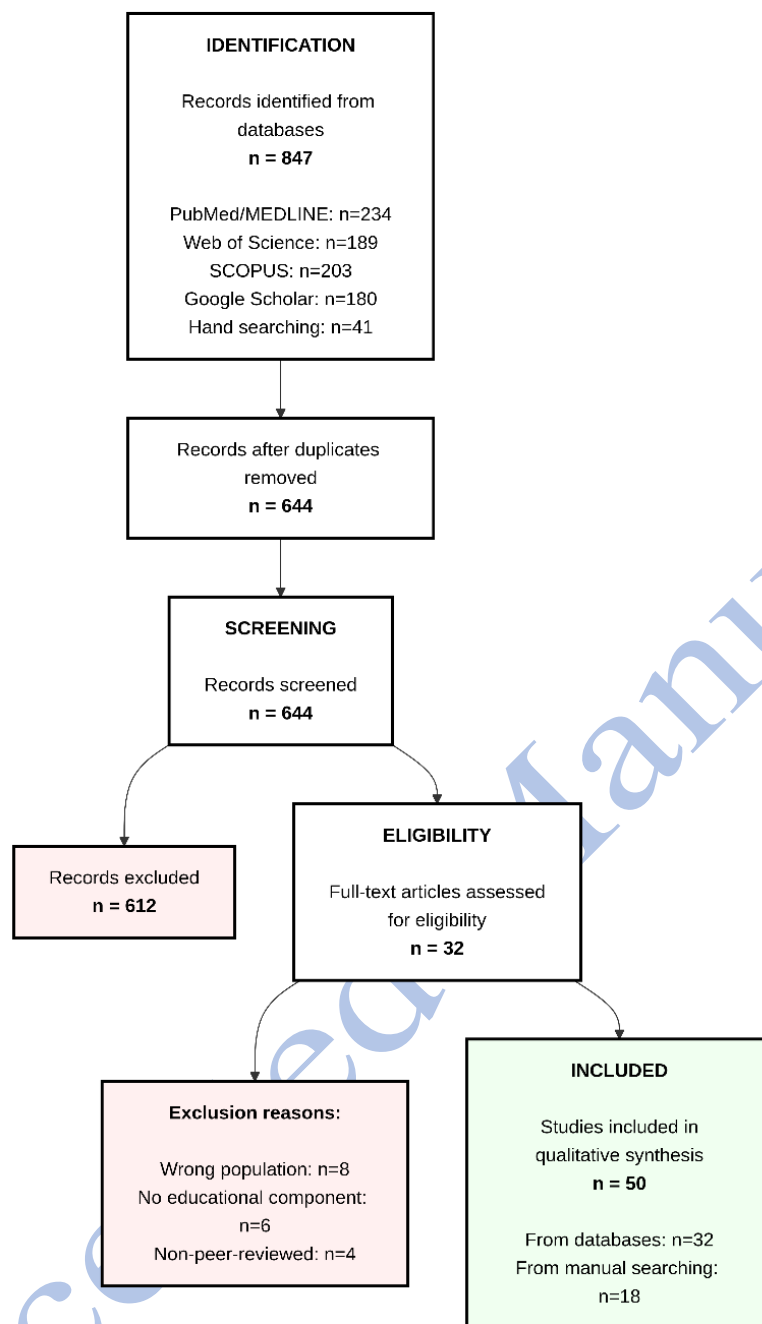


Figure 1. PRISMA 2020 flow diagram of study identification, screening, eligibility and inclusion.

Study Type Distribution (n=50)

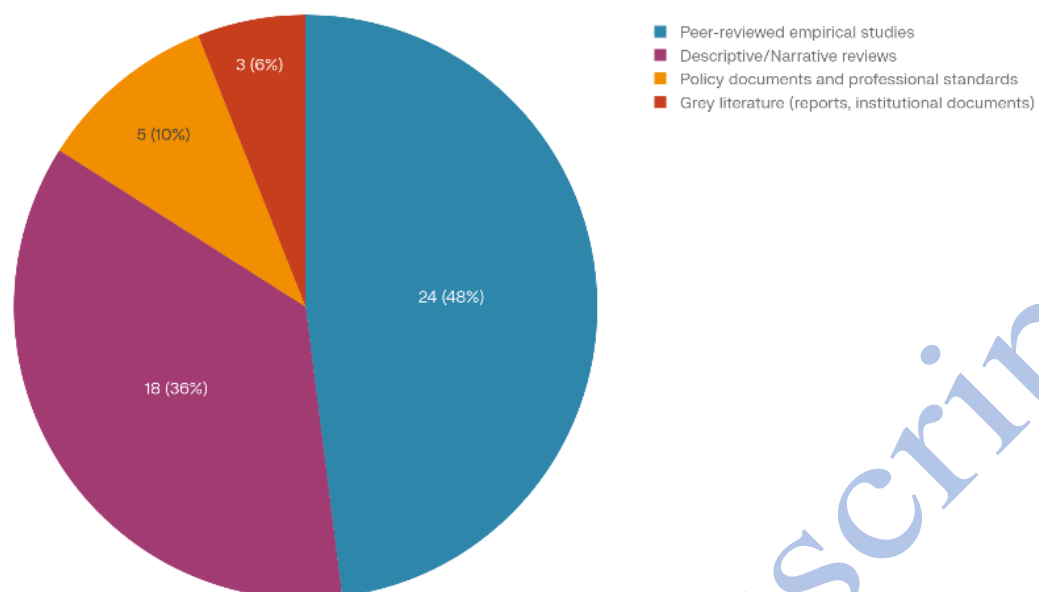


Figure 2. Distribution of included study types