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Society to Innovation: Lessons Learn from Audiology Universiti Sains Malaysia Service Learning Malaysia-University for Society (USM-SULAM)

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ABSTRACT

Service learning is a pedagogical approach that connects academic instruction with community engagement, providing reciprocal benefits to students and the populations they serve. This report is on a Universiti Sains Malaysia - SULAM (Service Learning Malaysia–University for Society) audiology project implemented in collaboration with industry and a special education secondary school for visually impaired students. The project combined in-person hearing screening, counselling, and hands-on hearing aid maintenance and modification training delivered by third-year audiology students under the supervision of experienced audiologists. Key outcomes included the identification of previously undetected hearing loss among secondary visually impaired or low vision students and improved audiology students to identify minor hearing aid breakdowns. Two principal lessons emerged: the immediate value of practical, hands-on hearing aid repair training for students, and the potential value of integrating teleaudiology as a future mechanism to sustain follow-up, support teachers and parents, and reduce device downtime. The project situates these outcomes within experiential learning theory and the evidence base for community and remote audiology services, discusses implementation challenges and mitigation strategies, and outlines recommendations for sustainability, curriculum integration, and staged teleaudiology adoption. The findings support a model of university–industry–community partnership that advances both education and hearing health access in resource-constrained settings.

1. Introduction

Service learning has been advanced as a high-impact educational strategy that intentionally integrates community service with academic instruction and reflective practice [1]. By placing

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students in authentic community contexts, service learning cultivates practical competencies, professional identity, and civic responsibility while addressing real societal needs. In Malaysia, the Department of Higher Education's SULAM initiative formalizes this approach at the national level, encouraging universities to embed community engagement into curricular activities and to develop solutions to local challenges [2]. Within allied health professions, and audiology specifically, such engagement is crucial because hearing healthcare needs are widespread, unevenly distributed, and frequently unmet in schools and communities with constrained access to specialist services.

The burden of hearing impairment and the consequences of untreated hearing loss have been well documented. In 2021, the World Health Organization's World Report on Hearing highlights the global prevalence of hearing loss and the urgent need for scalable models to expand ear and hearing care [3]. Children with dual sensory impairments — for example, visual impairment combined with hearing loss — face amplified barriers to learning and social participation, yet they are often underserved by standard hearing services [4].

In response to these intersecting needs, an Audiology Programme, Universiti Sains Malaysia (USM) SULAM project was conducted in mid-2025 in partnership with Best Hearing Aid Centre Sdn. Bhd. (BHAC) and a special education school for visually impaired and low vision students (the school is anonymized in this report). The initiative had three interrelated aims: to screen students with visual impairment or low vision for hearing impairment, to provide immediate basic audiological advice and counselling, and to provide a medium for USM audiology students to explore hearing aid maintenance and identify minor repairs. The educational rationale rested on experiential learning theory, which posits that learning is maximized when students engage concretely with problems, reflect on their experiences, conceptualize learning, and apply knowledge in practice [5]. The partnership with BHAC added an industry dimension that made available the technical expertise and consumables necessary for effective hands-on training.

This report presents a full account of project planning and implementation, documents measurable outcomes, analyses the principal lessons learned, and offers concrete recommendations for sustaining and scaling the model. The narrative deliberately frames teleaudiology as a future, staged recommendation rather than an implemented component; this distinction is important because the present activity emphasised in-person screening and repair training, while indicating the clear potential of teleaudiology for follow-up care and teacher/parent consultation.

2. Methodology and Project Implementation

The Audiology USM-SULAM project was planned and executed over a three-month period comprising preparatory work, two days of concentrated on-site activity, and ongoing post-project follow-up planning. The project team included thirteen third-year audiology students, an academic advisor from the university, and audiologists from Best Hearing. Preparatory activities involved stakeholder consultations, approval processes, equipment calibration, and a short briefing for students that covered communication strategies for working with visually impaired learners, infection control, basic troubleshooting of hearing devices, and protocols for referral.

The project was conducted through two main activities held on two separate days, each designed to address distinct but complementary aspects of audiology service learning. The first activity focused on hearing screening for students with visual impairments or low vision, while the second centred on experiential learning related to hearing aid manufacturing, repair, and modification.

On the screening days, the team operated in two sound-treated booths in the mobile audiometric testing centre that had been rented for this project (Fig. 1). Procedures included parent/guardian consent confirmation, taking case history, ear anatomy demonstration, video otoscopic examination,

tympanometry, and pure-tone screening across octave frequencies for school-aged hearing loss (Fig. 2 – Fig 5). In total, parental consent was obtained for sixty-nine students to be screened. Time constraints on the scheduled days meant that forty-seven students were actually screened; the remainder were scheduled for later assessment. Among those screened, fourteen students (approximately 30% of those screened) were identified with screening results suggestive of hearing loss or middle ear dysfunction and were referred for full diagnostic assessment and follow-up. The screening protocol emphasized clear communication with teachers, verbal explanations adjusted for the participants (school students), and the provision of written, accessible summary notes outlining findings and next steps.

The second activity, conducted at Best Hearing Aid Centre in Klang, Selangor, involved hands-on exposure to hearing aid manufacturing processes, repair techniques, and acoustic modification. Audiology students observed and practised ear impression taking, earmould production, and troubleshooting of malfunctioning hearing aids (Fig. 6 to Fig. 9). A major component of the on-site activity was the hands-on hearing aid maintenance workshop. Under Best Hearing's audiologists and technical supervision, students learned and practiced the following skills: external device cleaning, battery compartment inspection and repair, tubing/dome replacement for behind-the-ear devices, earmold trimming and modification for comfort and acoustic seal, and basic checks of acoustic output. Training was deliberately scaffolded so that students first observed demonstrations, then practised under direct supervision, and finally performed tasks with peers.

Fig. 1. Rented mobile audiometric testing centre

Fig. 2. Ear anatomy demonstration to visually impaired or low vision students

Fig. 3. Visual otoscopy examination

Fig. 4. Tympanometry measurement

Fig. 5. Pure tone audiometry screening in sound treated booth

Fig. 6. Company and product introduction

Fig. 7. Earmould modification and trimming

Fig. 8. Product and software training

Fig. 9. Ear impression training

3. Discussion

The implementation of this Audiology USM–SULAM project provided valuable insights into both the practical delivery of hearing services for visually impaired students and the educational development of audiology undergraduates. While the outcomes demonstrated clear benefits—such as early detection of hearing loss and enhanced student clinical skills—the experience also revealed deeper pedagogical lessons, operational challenges, and strategic opportunities for future improvement. This aligns with a previous study, which found that embedding service-learning into academic programs like SULAM significantly enhances students' ability to connect theoretical concepts with real-world community practices [6]. This discussion synthesises those findings under three key themes—lessons learned, challenges with mitigation strategies, and future directions.

3.1 Lessons Learned

Several important lessons emerged from the implementation of this Audiology USM–SULAM project, which involved hearing screening and hearing aid services for visually impaired students. The first key lesson is the undeniable value of experiential learning in audiology education. By engaging directly with a special-needs population in a real-world context, students moved beyond theoretical knowledge to develop practical, adaptable skills. They gained hands-on experience in conducting hearing screenings, interpreting results, performing basic hearing aid troubleshooting, and communicating effectively with individuals who require alternative instructional strategies. These experiences are difficult to replicate in a classroom or laboratory setting and are consistent with experiential learning principles, which emphasize the transformation of experience into knowledge through reflection and application [5].

A second lesson relates to the gap in continuity of hearing healthcare for visually impaired students. While none of the screened students were hearing aid users, the screening results revealed that some may require further diagnostic assessment and possible intervention. However, there is currently no systematic mechanism in place to ensure these students receive timely follow-up after screening. This finding highlights the importance of establishing structured referral pathways and ongoing support systems, such as school-based hearing health programs and periodic reassessment schedules. Incorporating teleaudiology follow-up could further enhance accessibility by enabling remote consultations with audiologists, reducing travel and logistical barriers for students and their families. Literature supports that early identification and continuous monitoring are critical in preventing long-term communication and educational difficulties, particularly for individuals in resource-limited or rural settings [7,8]. Moreover, evidence suggests that dual sensory impairment—concurrent hearing and vision loss—while relatively rare globally (0.2% to 2%), is often under-recognized due to inconsistent definitions and measurement approaches. This condition can exacerbate communication challenges and limit access to educational opportunities, reinforcing the need for systematic screening and integrated follow-up services in school-based health programs [9].

Finally, the project underscored the value of intersectoral collaboration. The partnership between the USM Audiology Programme, Best Hearing Aid Centre (BHAC), and the special education school significantly enhanced the technical capacity, logistical efficiency, and educational depth of the initiative. Such collaborations have long been advocated as sustainable models for community-based health interventions that enrich student readiness for professional practice [1]. Importantly, literature in audiology education highlights the critical need for academic–industry partnerships to be conducted ethically and transparently — with shared goals, clear conflict-of-interest management, and a commitment to student and client welfare [10]. These guiding principles ensured that the collaboration remained focused on pedagogical enrichment and community benefit, rather than commercial interests, thereby strengthening trust and mutual commitment across all stakeholders.

3.2 Challenges and Mitigation Strategies

While the project achieved its core objectives, it was not without challenges. One of the primary limitations was time. Although 69 students obtained parental consent for participation, only 47 could be screened within the planned schedule. This was primarily due to the time-intensive nature of conducting individual screenings in a mobile audiometric booth, especially when communication adjustments were required for visually impaired participants. To address this, the project team

prioritised high-risk cases and explored the possibility of conducting follow-up visits to complete the remaining screenings.

Communication barriers also posed a challenge. Standard clinical instructions had to be adapted for visually impaired participants, requiring the use of more descriptive verbal explanations, tactile models, and assistance from teachers to ensure that students understood the screening process. While these adaptations increased the duration of each screening, they significantly improved participant engagement and the accuracy of results. These adjustments are consistent with a previous study, which emphasised that assessments for individuals with combined sensory impairments often require a blend of behavioural testing and objective measures (e.g., otoacoustic emissions, auditory brainstem response) alongside functional observations in natural environments [11]. Incorporating tactile cues, shared participation with familiar communication partners, and environmental accessibility modifications can enhance both comfort and test reliability for individuals with sensory disabilities — strategies that proved equally beneficial in the present project.

Another notable challenge was the lack of immediate referral and follow-up mechanisms. Students identified with potential hearing loss did not have a built-in pathway for further audiological assessment or intervention. This gap risked delaying diagnosis and treatment. To partially address this, the team provided written reports and counselling to parents and teachers, along with referral recommendations to nearby audiology centres. However, the experience emphasised the need for a formalised follow-up model embedded within school health services, supported by teleaudiology solutions to facilitate remote consultations and monitoring. This finding mirrors observations by a previous study, which reported that many primary health care settings lacked basic hearing screening equipment, consistent referral practices, and adequate training to identify high-risk cases [12]. In their study, gaps in referral were also influenced by prevailing community beliefs—such as attributing hearing loss to supernatural causes—which could further delay care-seeking. Strengthening referral pathways thus requires not only logistical solutions but also targeted training for frontline health workers and culturally sensitive caregiver education to ensure timely intervention. A further challenge emerged during the second-day training visit to the BHAC. While the activity provided valuable practical exposure to hearing aid manufacturing and repair, it also revealed that most students had limited prior knowledge of the processes involved. This required trainers to allocate additional time for foundational explanations before hands-on practice could begin. Although this slowed the pace of the session, it ultimately enhanced the depth of learning and ensured that participants could confidently apply the skills introduced.

3.3 Future Direction

Building on the lessons learned and the challenges encountered, several strategic enhancements are proposed to improve sustainability, accessibility, and the educational richness of the program. First, integrating teleaudiology consultations will be instrumental in facilitating follow-up, especially since parents were not present during screenings—students were residing on campus—but many expressed interest in receiving their children's results remotely. A Malaysian study surveyed local audiologists and found that over half believed teleaudiology could enhance quality of care and access, suggesting a favorable professional attitude [13]. More recently, a validation study among school-aged children in Malaysia confirmed the reliability of remote audiometry, reinforcing its readiness for broader implementation [14]. Educational settings have also demonstrated effective deployment of teleaudiology in special education centres, achieving impressive reach and satisfaction without compromising service standards [15]. Complementing these findings, a previous study emphasised the importance of cross-disciplinary collaboration—particularly between

audiologists and engineers—to design user-friendly, low-bandwidth teleaudiology systems that address infrastructure limitations in rural and school-based contexts [16].

Second, equipping school and clinical stakeholders with low-bandwidth teleaudiology tools and protocols would significantly enhance accessibility, especially in resource-constrained settings. Technical recommendations include data-efficient platforms and stepwise implementation plans that align with local infrastructure capacities. Third, the project should be extended to additional special education schools, transforming the model into a sustainable academic curriculum component. This expansion would institutionalise experiential learning while fostering meaningful, ongoing community partnerships. Finally, establishing comprehensive monitoring and evaluation frameworks—including metrics such as teleconsultation uptake, referral completion rates, and student learning outcomes—will support continual project refinement and stakeholders' buy-in for scaling efforts.

3. Conclusion

This Audiology USM–SULAM project demonstrated that targeted service-learning activities can have dual benefits: improving access to hearing health services for a vulnerable population and enriching the professional competencies of future audiologists. The first day's hearing screening successfully identified students with potential hearing concerns, highlighting the importance of integrated sensory health programs for those with visual impairments. The second day's technical training at Best Hearing Aid Centre enhanced students' knowledge of hearing aid production, repair, and ear impression techniques, providing a deeper understanding of the processes that underpin audiological rehabilitation. Although no hearing aids were fitted to the screened students, the skills gained will serve students in their future clinical roles.

The project also underscored the value of multi-sector collaboration between universities, specialist schools, and private industry in creating meaningful, resource-efficient outreach. Addressing challenges such as time constraints, environmental noise, and communication barriers will be critical for improving future implementations. By incorporating systematic follow-up, exploring teleaudiology solutions, and expanding partnerships, future iterations of this program have the potential to make an even greater impact—ensuring that no student's hearing needs go unnoticed, while continuing to provide audiology students with transformative, real-world learning experiences.

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References

[1] Bringle, Robert G., and Julie A. Hatcher. "Implementing service learning in higher education." *The Journal of Higher Education* 67, no. 2 (1996): 221-239. https://doi.org/10.1080/00221546.1996.11780257.

[2] Department of Higher Education Malaysia, Ministry of Education Malaysia, Siti Norulhana Miskan, Muhammad Zaiful Hisham, Yb Dr. Maszlee Bin Malik, Ybhg. Dato' Dr. Mohd Gazali Bin Abas, And Ybhg. Datuk Ir. Dr. Siti Hamisah Binti Tapsir. 2019. *Service Learning Malaysia - University For Society*.

[3] World Health Organization. 2021. "WORLD REPORT ON HEARING." Report. World Health Organization. http://apps.who.int/iris.

[4] Hersh, Marion. "Deafblind people, communication, independence, and isolation." *Journal of deaf studies and deaf education* 18, no. 4 (2013): 446-463. https://doi.org/10.1093/deafed/ent022.

[5] Kolb, David A. *Experiential learning: Experience as the source of learning and development*. FT press, 2014.

[6] Hanum, H., MS Amir Farhan, AH Nurul Ashikin, MN Mohd Faiz, SS Sharifah Dara Naqiyah, A. H. Rosniza, and H. Hasnah. "From classes into practices: The impacts of implementing SULAM in public University on the students." In *AIP Conference Proceedings*, vol. 2347, no. 1, p. 020168. AIP Publishing LLC, 2021. https://doi.org/10.1063/5.0051465.

[7] Muñoz, Karen, Naveen K. Nagaraj, and Natalie Nichols. "Applied tele-audiology research in clinical practice during the past decade: a scoping review." *International Journal of Audiology* 60, no. sup1 (2021): S4-S12. https://doi.org/10.1080/14992027.2020.1817994.

[8] Swanepoel, De Wet, and James W. Hall III. "A systematic review of telehealth applications in audiology." *Telemedicine and e-Health* 16, no. 2 (2010): 181-200. https://doi.org/10.1089/tmj.2009.0111.

[9] Minhas, Renu, Atul Jaiswal, Serena Chan, Jessica Trevisan, Abinethaa Paramasivam, and Roxanna Spruyt-Rocks. "Prevalence of individuals with deafblindness and age-related dual-sensory loss." *Journal of Visual Impairment & Blindness* 116, no. 1 (2022): 36-47. https://doi.org/10.1177/0145482x211072541.

[10] Windmill, Ian M., Barry A. Freeman, James Jerger, and JACK M. Scott. "Guiding principles for the interaction between academic programs in audiology and industry." *Audiology Today* 22, no. 2 (2010).

[11] Mascia, John, and Nancy Mascia. "Methods and strategies for audiological assessment of individuals who are deaf-blind with developmental disabilities." In *Seminars in Hearing*, vol. 24, no. 03, pp. 211-222. Copyright© 2002 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel.:+ 1 (212) 584-4662, 2003. https://doi.org/10.1055/s-2003-41350.

[12] Khan, Nasim B., Lavanithum Joseph, and Miriam Adhikari. "The hearing screening experiences and practices of primary health care nurses: Indications for referral based on high-risk factors and community views about hearing loss." *African Journal of Primary Health Care and Family Medicine* 10, no. 1 (2018): 1-11. https://doi.org/10.4102/phcfm.v10i1.1848.

[13] Rashid, Mohd Fadzil Nor Bin, Tian Kar Quar, Foong Yen Chong, and Nashrah Maamor. "Are we ready for teleaudiology?: Data from Malaysia." *Speech, Language and Hearing* 23, no. 3 (2020): 146-157. https://doi.org/10.1080/2050571x.2019.1622827.

[14] Quar, Tian Kar, Nashrah Maamor, Foong Yen Chong, and Mohd Fadzil Nor Rashid. "Validation and reliability of teleaudiology approach among deaf or hard of hearing school age children in Malaysia: a preliminary study." *Speech, Language and Hearing* 28, no. 1 (2025): 2421649. https://doi.org/10.1080/2050571x.2024.2421649.

[15] Rashid, Mohd Fadzil Nor, Nashrah Maamor, Chong Foong Yen, and Quar Tian Kar. "Development of teleaudiology service in special education service centre in Malaysia: Lessons learned." *Audiology* 1 (2024): 2. https://doi.org/10.37934/araset.34.1.289298.

[16] Rashid, Mohd Fadzil Nor, M. R. Isa, Mahamad Almyzan Awang, Quar Tian Kar, and Mohd Normani Zakaria. "Teleaudiology and calling for engineering collaboration: A state of art review." In *WORLD CONGRESS ON SCIENCE, ENGINEERING AND TECHNOLOGY (WCOSET) 2021*, vol. 2571, no. 1, p. 030002. AIP Publishing LLC, 2023. https://doi.org/10.1063/5.0116401.