



SIGN2Inclusion

New Sign Language Terms

This project is funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.



Analysis of existing literature

Introduction

Taking into consideration that languages are constantly changing, and that globalization also influences this change, one should not forget that sign languages also experience some change although they are not universal. There are countries that have two official sign languages (Munoz-Baell et al., 2011) like Spain, and countries that do not consider it to be an official language such as Denmark, Luxembourg, Malta, the Netherlands, Poland and Bulgaria although it is recognized by some internal authorities (Mastrokoukou et al., 2016).

The extensive use of technology through social media and smartphones allows more access towards communicating via sign language, but at the same time individuals who are deaf or hard of hearing can experience challenges in their everyday communication in being able to understand complex topics and address issues related to climate change and environmental changes, especially when offering innovative solutions for sustainable practices (Chen et al., 2023; Farghali et al., 2023). Access to these technologies is equally important for the DHH community, as it promotes social inclusion and breaks communication barriers (Alsalem & Alzahrani, 2023) since hearing individuals acquire knowledge almost everywhere. However, gaps in sign language within these domains hinder effective communication among DHH individuals, highlighting the need for new sign language terms to enhance their engagement and inclusion (Maryam, 2020). Collaborative efforts in developing inclusive educational environments and integrating technology in sign language education are essential to empower DHH individuals to actively participate in environmental initiatives and daily life.

The necessity to "address the challenges of climate and environmental change for the world's disabled populations from an intersectionality lens in order to effectively foster sustainable inclusive and just futures" is highlighted by Gaskin et al. (2017), who also discuss the significance and the efforts made to include groups of people towards environmental education (as cited in Kosanic et al., 2022). To enable DHH people to actively engage in environmental activities and daily life, cooperative efforts in creating inclusive learning environments and incorporating technology into sign language instruction are crucial.

Climate Change, Environment, and Emerging Technologies

Climate change has led to visible environmental effects such as global warming, rising sea levels, and increased extreme weather events, negatively impacting human health, food

A2.3 - Unified Report on national research

production, water availability, and causing economic losses exceeding 500 billion dollars (Chen et al., 2023). Innovative technologies like Carbon Capture and Storage (CCS) are pivotal in preventing climate change and environmental issues (Li et al., 2022).

Artificial intelligence (AI) has become a central player in transforming the energy sector, with potential benefits for energy efficiency and sustainable development (Baysan et al., 2019; Farghali et al., 2023). However, concerns about AI's energy consumption and its impact on climate change require further research to optimize its sustainability (Cowls et al., 2021). Understanding key scientific terms such as "climate informatics," "carbon-neutral," "climate AI," and "smart grid technologies" is crucial for informed discussions about climate change and emerging technologies (Li et al., 2023).

Current Statistics and Challenges for DHH Populations

In the European Union, approximately 51 million people are hard of hearing, constituting around 9% of the population or approximately 1 in 10 people (EFHO, 2015). In Cyprus, there are approximately 40,000 deaf people (3.3% of the general population) (Intesign University, 2022). Challenges faced by the DHH populations in areas like Cyprus and the EU include limited access to quality education, healthcare services, employment opportunities, and social inclusion. Barriers such as inadequate sign language resources, communication challenges in healthcare settings, discriminatory practices in employment, and social isolation due to communication barriers contribute to these challenges. Based on the publication of European Union of the Deaf (EUD) the unemployment rate of deaf people in the EU is unjustifiably low with lack of statistics to measure the situation of deaf people (European Union of the Deaf, 2023). These issues require prioritizing the needs of the DHH population through targeted measures, inclusive policies, and awareness campaigns to ensure their full inclusion in society.

Current Situation in Cyprus

The current situation in Cyprus can be described as static due to the reasons that since 1993 where DHH children were included in general schools as well as the choice of attending the School of Deaf, the teaching methodologies, the curriculum and the procedures of instruction remain the same.

Despite attending subjects such as Design and Technology or Science, the curriculum and the facilities existing did not change much. The introduction of specific terms may be given, however due to the gap towards providing them with the correct sign, issues arise by keeping the DHH children on the side. For instance, and as explained by one of the teachers at the Deaf

A2.3 - Unified Report on national research

School, the word 'PowerPoint' is signed by using the terms 'power' and 'point' which do not represent the meaning of the actual word 'PowerPoint' and what one should be able to understand (i.e. preparing a presentation)

Overall, technology and information are not accessible to the deaf community although efforts have been made to bridge this gap using Connect Deaf, a mobile application that gives the d/DHH the opportunity to become more independent and by forming an online community where deaf individuals can connect with others and build evocative relationships.

Strategies to Promote DHH Participation and Inclusion

Effective integration of DHH individuals into society and the employment market requires a range of strategies. These include specialized education programs with support services like sign language interpretation and assistive technologies, awareness training to create inclusive environments, mentorship programs and integration of DHH perspectives into curricula and workplace policies (Alsalem and Alzahrani, 2023). In addition, customized STEM strategies and information technology (ICT) tools tailored to DHH needs further enhance academic and professional development, contributing to a diverse and equitable society (David et al., 2023). Many studies emphasize the importance of these strategies in empowering DHH individuals, enabling meaningful engagement and access to opportunities across various life domains (Alsalem and Alzahrani, 2023; David et al., 2023)

Conclusion

In conclusion, addressing gaps in sign language related to climate change, the environment, and emerging technologies is crucial for fostering inclusivity and accessibility for DHH individuals. Introducing new sign language terms, implementing best practices for sign language development, advocating for inclusive policies, and promoting targeted strategies for DHH participation and inclusion are essential steps toward creating a more equitable and inclusive society. By prioritizing the needs of the DHH population and leveraging technology and community collaboration, we can build a society that empowers and embraces individuals of all abilities and essentially enhances communications, diverse perspectives, inspires innovative solutions, and opens educational opportunities.

References

- Alsalem, M. A., & Alzahrani, H. A. (2023). The Role of Institutional Practice in Promoting Inclusive Education for Deaf and Hard of Hearing Students: A Critical Analysis. *Sage Open*, 13(4). doi.org/10.1177/21582440231203435
- Baysan, S., Kabadurmus, O., Cevikcan, E., Satoglu, S. I., & Durmusoglu, M. B. (2019). A simulation-based methodology for the analysis of the effect of lean tools on energy efficiency: An application in power distribution industry. *Journal of Cleaner Production*, 211, 895–908. doi:10.1016/j.jclepro.2018.11.217
- Chen, L., Chen, Z., Zhang, Y., Liu, Y., Osman, A. I., Farghali, M., ... Yap, P.-S. (2023). Artificial intelligence-based solutions for climate change: a review. *Environmental Chemistry Letters*, 21(5), 2525–2557. doi:10.1007/s10311-023-01617-y
- David, A., Kiose, V., & Tzelepi, E. (2023). ICTs in education for Deaf and Hard-Of-Hearing learners. *World Journal of Biology Pharmacy and Health Sciences*, 14(3), 222–236. doi:10.30574/wjbphs.2023.14.3.0273
- EFHO. (2015). Retrieved from Hearing Loss: The Statistics: <https://efhoh.org/wp-content/uploads/2017/04/Hearing-Loss-Statistics-AGM-2015.pdf>
- European Union of the Deaf. (2023, November 16). Retrieved from EUD Policy Recommendations on the establishment of targets for the employment of deaf people: <https://www.eud.eu/eud-policy-recommendations-on-the-establishing-of-targets-for-the-employment-of-deaf-people/>
- Farghali, M., Osman, A. I., Mohamed, I. M. A., Chen, Z., Chen, L., Ihara, I., ... Rooney, D. W. (2023). Strategies to save energy in the context of the energy crisis: a review. *Environmental Chemistry Letters*, 1–37. doi:10.1007/s10311-023-01591-5
- Flaherty, M., Sato, A., & Kirby, S. (2023). Documenting a reduction in signing space in Nicaraguan Sign Language using depth and motion capture. *Cognitive Science*, 47(4), e13277. doi:10.1111/cogs.13277
- Gärdenfors, M. (2023). Writing development in DHH students: A bimodal bilingual approach. *Journal of Deaf Studies and Deaf Education*, 28(2), 211–225. doi:10.1093/deafed/enac045

A2.3 - Unified Report on national research

Hall, M. L., Hall, W. C., & Caselli, N. K. (2019). Deaf children need language, not (just) speech. *First Language*, 39(4), 367–395. doi:10.1177/0142723719834102

Guardino, C., & Antia, S. D. (2012). Modifying the classroom environment to increase engagement and decrease disruption with student who are deaf or hard of hearing. *Journal of Deaf Studies and Deaf Education*, 17(4), 518–533.

Hassan, Q., Sameen, A. Z., Salman, H. M., Al-Jiboory, A. K., & Jaszczur, M. (2023). The role of renewable energy and artificial intelligence towards environmental sustainability and net zero. doi:10.21203/rs.3.rs-2970234/v1

Intesign University. (2022, September). Retrieved from CYPRUS: What sign languages are used in Cyprus?: <https://www.intersignuniversity.com/post/cyprus-facts#:~:text=There%20are%20an%20estimated%2039%2C840,3.3%25%20of%20the%20general%20population.>

Kosanic, A., Petzold, J., Martin-Lopez, B. & Razanajatovo, M. (2022) An inclusive future: disabled populations in the context of climate and environmental change, *Current Opinion in Environmental Sustainability*, 55, 101-159

Li, H., Hao, Y., Xie, C., Han, Y., & Wang, Z.-R. (2023). Emerging technologies and policies for carbon-neutral transportation. *International Journal of Transportation Science and Technology*, 12(1), 329–334. doi:10.1016/j.ijtst.2022.09.002

Mastrokourkou, S., Dolza, E., Carlotta, C., & Georgiadis, M. (2016). International Sign: A practical kit. (PDF) [International Sign: A Practical kit \(researchgate.net\)](https://www.researchgate.net/publication/311111111)

Muñoz-Baell, Irma M., María Teresa Ruiz-Cantero, Carlos Álvarez-Dardet, Emilio Ferreiro-Lago, and Eva Aroca-Fernández. 2011. “Deaf Communities: Patients or Citizens?” *Gaceta Sanitaria* 25 (1) Ediciones Doyma, SL: 72–78

Rastgoo, R., Kiani, K., Escalera, S., Athitsos, V., & Sabokrou, M. (2024). A survey on recent advances in Sign Language Production. *Expert Systems with Applications*, 243, 122846. <https://doi.org/10.1016/j.eswa.2023.122846>

Salehomoum, M. (2020). Inclusion of signing deaf or hard-of-hearing students: Factors that facilitate versus challenge access and participation. *Perspectives of the ASHA Special Interest Groups*, 5(4), 971–983. doi:10.1044/2020_persp-19-00124

Snoddon, K., & De Meulder, M. (2020). Introduction: Ideologies in sign language vitality and revitalization. *Language & Communication*, 74, 154–163. doi:10.1016/j.langcom.2020.06.008

The University of Edinburgh. (2023, August 21). Retrieved from Sign language glossary goes for green growth: <https://www.ed.ac.uk/news/2023/sign-language-glossary-goes-for-green-growth>

A2.3 - Unified Report on national research

Vesel, J. (2005). Signing Science! Andy And Tonya Are Just Like Me! They Wear Hearing Aids And Know My Language!?. *Learning & leading with technology*, 32(8).

Wilberforce, T., Olabi, A. G., Sayed, E. T., Elsaid, K., & Abdelkareem, M. A. (2021). Progress in carbon capture technologies. *The Science of the Total Environment*, 761(143203), 143203. doi:10.1016/j.scitotenv.2020.143203